FLIGHT

THE AIRCRAFT ENGINEER AND AIRSHIPS

A JOURNAL DEVOTED TO THE SCIENCE, PRACTICE, AND HISTORY OF AERONAUTICS, LOCOMOTION AND TRANSPORT.

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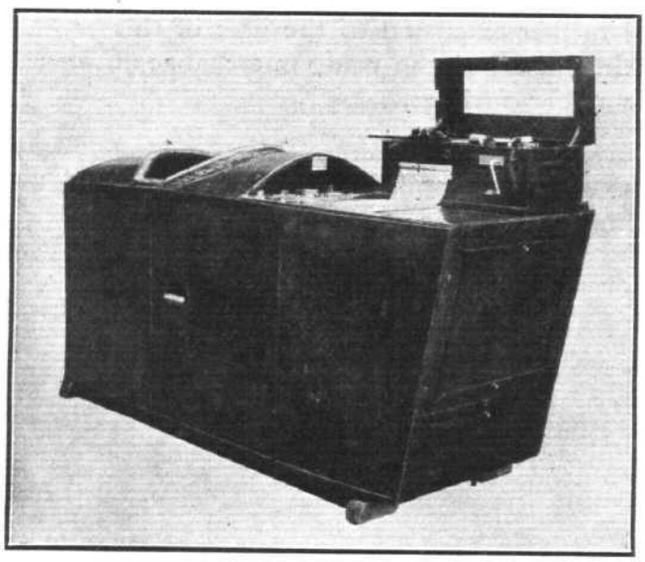

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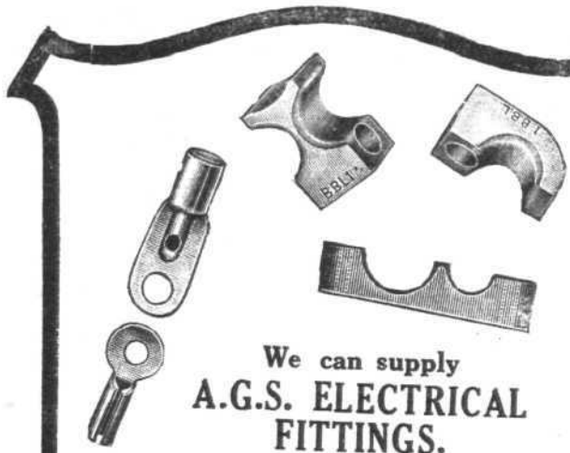

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CONTENTS

DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list—

1929

Jan. 31 .... Lecture, "Monoplane or Biplane?" by W. S. Farren, before R.Ae.S. and Inst.Ae.E.

Feb. 14 .... "Air-cooled Engines in Service," by A. H. R. Fedden, before R.Ae.S. and Inst.Ae.E.

Feb. 28 .... Lecture, "The Flutter of Aeroplane Wings," by R. A. Frazer, before R.Ae.S. and Inst.Ae.E.

Mar. 7 .... Lecture, "Airscrew Body Interference," by C. N. H. Lock, before R.Ae.S. and Inst.Ae.E.

Mar. 14 .... Lecture, "Engine Performance Tests," by Wing-Commdr. C. B. Hynes, before R.Ae.S. and Inst. Ae.E.

Mar. 18 .... Lecture, "The Helicogyre," by V. Isacco, before R.Ae.S. and Inst.Ae.E.

Mar. 29-30 Cinque Ports Flying Club Easter Meeting, Lympne.

EDITORIAL COMMENT

THE informal dinners inaugurated by the Royal Aeronautical Society are intended to encourage a freer discussion than those which usually take place at the more formal lectures, the fact that speeches and remarks made will not be officially reported if the speakers so desire being intended to remove any hesitancy that might be caused by the thought of later seeing one's after-dinner contributions in cold print. Respecting in spirit as well as in the letter the wishes of the Royal Aeronautical Society in this direction, we refrain from publishing in this issue any detailed report of the speeches made at the informal dinner held jointly by the Royal Aeronautical Society and the Institution of Automobile Engineers on January 24. The general trend of the discussion was, however, associated with a subject of very great interest, and should, therefore, be placed on record. The subject chosen was "Crude oil or petrol engines," Wing-Commander Hynes having agreed to establishing the case for the crude oil engine, and Capt. Wilkinson, of Napier's, defending the petrol engine.

Crude Oil or Petrol

Among the advantages of the compression ignition engine advanced by Wing-Commander Hynes, particular stress was, very naturally, laid on the increased fuel economy, and it was pointed out that in making the comparison one should count in the engine and its fuel. If that were done, it was found, according to a graph prepared in 1927 by Mr. Taylor of the R.A.E., that after some six to ten hours' flight, the compression ignition engine began to show a lower weight than the petrol engine.

Captain Wilkinson disagreed on this point, using the argument that in making the estimate no account had been taken of improvements in the fuel consumption of the petrol engine. In point of fact, a petrol engine, a rather special one certainly, had shown a full-power consumption as low as 0·41 lb. per horse-power per hour, while at three-quarter throttle the consumption was as low as 0·31 lb./ h.p./ hour. No compression ignition engine had so far reached such low figures. Moreover, the compression ignition engine required larger cylinders for the same power,

and this increased both size and weight, factors which in turn reacted on the aircraft.

Captain Irving, the designer of Major Segrave's racing car, and Mr. Fedden, designer of the Bristol aero engines, both advanced the views that, given sufficient encouragement, the compression ignition engine could be developed, Mr. Fedden, expressing the opinion that if the capital necessary for development were forthcoming there was no reason why, in three years' time, a 1,000 h.p. compression ignition engine should not be produced having a reliability as great as that of the petrol engine. His estimate of the weight, under these conditions, was three pounds per horse-power.

Major G. P. Bulman pointed out that with the small nozzles and rather delicate pumps required by the compression ignition engine, the fuel specification for the heavy oil would have to be quite as carefully designed as that of the present-day petrol.

Tempting as looks the possibility of being able to burn, in our aircraft engines, fuel costing some £5 per ton, one should not lose sight of the fact, as pointed out during this discussion, that as soon as the demand for crude oil increases as a result of general use, the price will certainly go up, and the present price difference will tend to be greatly reduced. Consequently we think one should not stress too much the question of relative cost. Rather should one look to other factors for weighing up the pros and cons of the two types of engine. To us it seems that both types will undoubtedly have their uses. For airship work, for instance, the compression ignition engine will undoubtedly score. Airships are pre-eminently long-distance craft, and consequently the greater initial weight of the compression ignition engine is soon outweighed. That is to say if one counters Captain Wilkinson's argument by assuming that his special petrol engine of low fuel consumption may have its counterpart among the compression ignition engines. The question of fire is also an important one, and it is usually claimed that the heavy oil is less dangerous than is petrol, as it gives off no vapour at ordinary temperatures.

Colonel Tizard, we think, summed up the general opinion very well by pointing out that this country cannot afford to neglect a type of power plant which is receiving a good deal of attention abroad. It may supersede the petrol engine or it may not. That it has possibilities cannot be denied, and its development would seem to be a logical corollary of the development of the rigid airship.

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U.S. Airship Base

MR. WILBUR, Secretary of the Navy of the U.S.A., has recommended to Congress that a naval airship base costing £1,000,000 should be established on the Pacific coast, and he suggested that an initial appropriation of £400,000 be made for the work to be commenced.

Aircraft on Instalment Plan

A 5,000,000-DOLLAR company is to be formed in America to finance sales on all classes of aeroplanes on the instalment plan.

New Caproni Military Machine

A REPORT from Milan states that a new Caproni military aeroplane of very large dimensions is nearly completed. Its weight is reputed to be 15 tons and estimated speed is 120 m.p.h., with fuel capacity for 70 hours. If adapted for civil work, 100 passengers could, apparently, be accommodated.

Safe Aircraft Competition

FIVE British aircraft companies have entered for the Guggenheim Safe Aircraft Competition, which closes on October 31, 1929. They are: De Havilland Aircraft Co., Ltd.; Handley Page, Ltd.; Vickers, Ltd.; the Gloster Aircraft Co., Ltd.; and the Cierva Autogiro Co., Ltd. Six American companies have entered. They are: the Curtiss Aeroplane and Motor Co.: Schroeder-Wentworth Associates of Glencoe, Illinois; Charles Ward Hall, Inc., of Buffalo, New York; Heraclio Alfaro, of Cleveland, Ohio; J. S. McDonnell, Jr., and Associates of Milwaukee, Wisconsin; and the Brunner Winkle Aircraft Corp., of Brooklyn, New York. The Societa Italiana Ernesto Breda, of Milan, is the only Italian entrant so far.

The Long-Distance Attempt

Many years ago FLIGHT lamented the fact that Great Britain had dropped right out of the picture in the matter of world's records. It is therefore with considerable satisfaction that we are in a position to describe briefly this week, and illustrate, the new Fairey monoplane with Napier "Lion" engine which is now undergoing tests preparatory to making an attempt to beat the world's duration and distance records. The machine has been specially designed for the purpose, a fact which incidentally establishes something of a record in itself, as with the exception of the Schneider seaplane machines, no British aircraft has been specially designed for such purpose for very many years, if ever.

A most interesting point in connection with the Fairey machine is that the model tests carried out in the wind tunnel tallied almost exactly with the previously calculated figures, and better still, when the machine was flown, the full-scale tests agreed with the model figures to a surprising degree. The engine tests have also, we understand, been very satisfactory from the fuel consumption point of view, so that altogether it looks as if the new British attempt starts with very good prospects of success. And best of all, the duration and distance records are among the few really worth while records.

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The Missing Engine

The fact that our aviation language is so full of "slang" was responsible some years ago, for a newspaper reporter getting into print with the story of an engine that had dropped out of the machine, when actually the engine was only "missing" in the sense we normally use the expression. Recently, however, it seems that an engine has fallen out in real earnest, but under circumstances which deserve to be made quite clear, in order that the accounts of the daily news sheets shall not spread an erroneous impression. The facts, as reported to us, are that a young flying pupil, it appears, was flying his machine, a D.H.9 very low, and in so doing struck a tree, smashing the propeller and more or less wrecking the engine, which this time was "missing" from the machine in the sense of the expression conveyed to the reporter years ago. The important point to make quite clear is that the engine "fell out" of the machine *after* the argument with the tree, and that the accident was due not to the engine falling out, but to the low flying.

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Institute of Metals

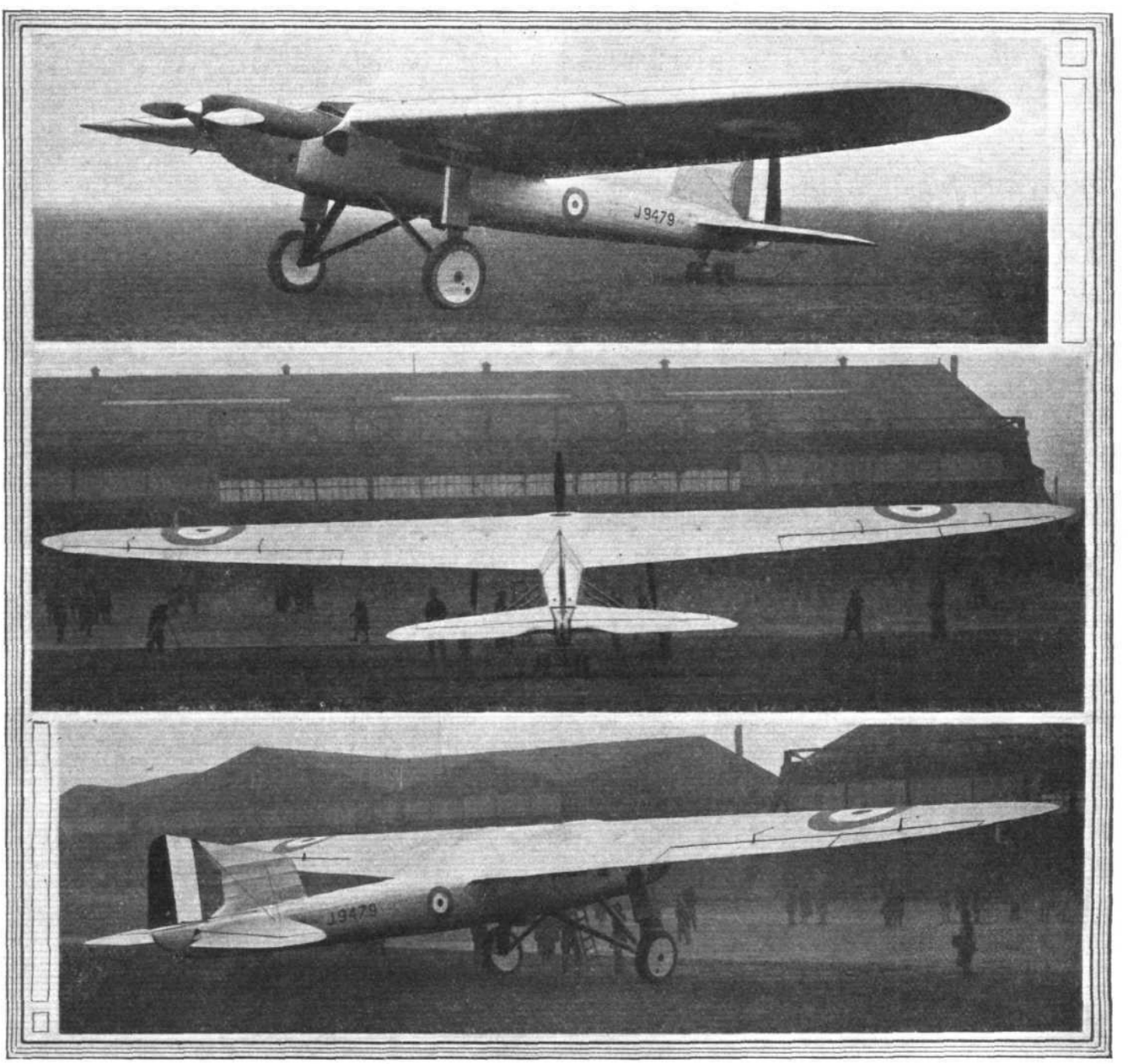
ON March 13 and 14 next, the Institute of Metals—which was founded in 1908—will be holding its "Coming-of-Age Celebrations." The Annual General Meeting of the Institute will be held on March 13, followed in the evening by a dinner and dance, at which one of the speakers will be Sir Samuel Hoare, Secretary of State for Air. On both days a number of papers will be read, and the proceedings will conclude with a Conversazione and Exhibition at the Science Museum. The dinner will be held at the Trocadero, Piccadilly, while the meetings will take place at the Institute of Mechanical Engineers, Storey's Gate, Westminster.

FLIGHT

THE FAIREY LONG-RANGE MONOPLANE

Napier "Lion" Engine

DURING the discussion of Prof. Melvill Jones's paper on "The Streamline Aeroplane," read before the Royal Aeronautical Society recently, Captain C. C. Walker, of the de Havilland Aircraft Co., pointed out that it would appear that the de Havilland "Tiger Moth" came somewhere near, or at least went a considerable distance towards, the ideal streamline aeroplane. The Schneider Trophy machines were other examples. In the large aeroplane class there have hitherto been few, if any, machines which could be said to have advanced sensibly towards the machine in which the only drag was the induced drag on the wing and the skin friction on the surfaces of the whole machine. In the Fairey long-distance monoplane there is cause to believe that yet another step has been made towards Prof. Melvill Jones's ideal. The Air Ministry has elected to surround this machine with a certain degree of secrecy, which prevents one from discussing in full many of the interesting features with which this new product of the Hayes establishment bristles. Nevertheless, sufficient information has been released by the Air Ministry for a student of the data and photographs which we publish this week to form a fairly good idea of the degree of aerodynamic refinement which has been achieved in the design of the machine. In the following we will give first the actual text of the Air Ministry notes dealing with the machine, and then a few comments on certain statements made therein, and deductions from an inspection of the photographs.



["FLIGHT" *Photographs*

THE BRITISH ATTEMPT TO BEAT THE WORLD'S DISTANCE RECORD: Three views of the Fairey Monoplane, with Napier "Lion" engine.

Facts—

"1. *Aircraft Structure and Layout.*—The machine is a pure cantilever monoplane. The wing varies throughout its span in thickness, chord, and incidence. Tests have shown that the wing possesses a very high lift coefficient and there is no sudden stall after the angle of maximum lift has been reached.

"The tail is also a cantilever, the only internal bracing wires on the machine being those to support the fin. (This should, obviously, have read *external*.—ED.)

"Previous cantilever monoplanes without solid covering

["FLIGHT" *Photograph*

THE CREW: On the right—Squadron-Leader Arthur G. Jones-Williams, M.C., C.O. of No. 23 (Fighter) Squadron, and Flight-Lieut. Eric V. Major, of No. 2, Flying Training School, Digby, who will fly the Fairey monoplane in the forthcoming attempts to beat world's records.

have experienced trouble with twisting of the wing during manœuvre; in this design this is obviated by special patented internal bracing.

"The undercarriage is of normal type, the wheel track being very wide to give stability on the ground, and the wheels and tyres being of specially strengthened type. The wheels are mounted on ball bearings to assist the take-off.

"The main dimensions are as follows:—

	Ft.
"Span (main plane)	82
Length	48½
Chord (at centre line)	16
Chord (mean)	11
Height	12

"2. *Engine.*—The engine is practically a normal service engine of well-tried type with carburettors tuned for economy and slightly higher compression-ratio pistons fitted.

"3. *Tests.*—(*a*) Exhaustive wind-channel tests were carried out at the National Physical Laboratory before construction was commenced in order to check the aerodynamics of the aircraft.

"(*b*) Half a wing was made and tested under full load conditions (including factors of safety) for all conditions of flight.

"(*c*) When the fuselage was erected the rear end was loaded up to test the torsional rigidity of the structure under fin and tail loads.

"(*d*) A wheel was loaded beyond any load that will occur during landing without any sign of failure.

"(*e*) An identical engine was run on the bench for 70 hours under the conditions that will obtain during the flight.

"All these tests have been most satisfactory.

"4. *Fuel and Oil.*—The machine carries more than a thousand gallons of fuel carried in the wings, feeding by gravity to a collector tank under the floor of the cabin, whence it is pumped to the engine. If the engine pump fails, a wind-driven pump can be immediately pushed through the side of the fuselage, and if that fails a hand pump can be used.

"The main oil filter is duplicated, so that the flow can be switched over to No. 2 while No. 1 is being cleaned.

"5. *Cabin.*—The cabin is totally enclosed, provision being made for cleaning the windows. All windows are of triplex and open for ventilation, if necessary. The navigator can look downward through the wings and through a special sight in the floor for taking drift sights, as well as through the roof light. There are also windows in the sides.

"The pilot's seat is fitted with pneumatic upholstery and a pneumatic bed is provided for use in the cabin.

"The navigator has a comfortable seat and folding table to work at.

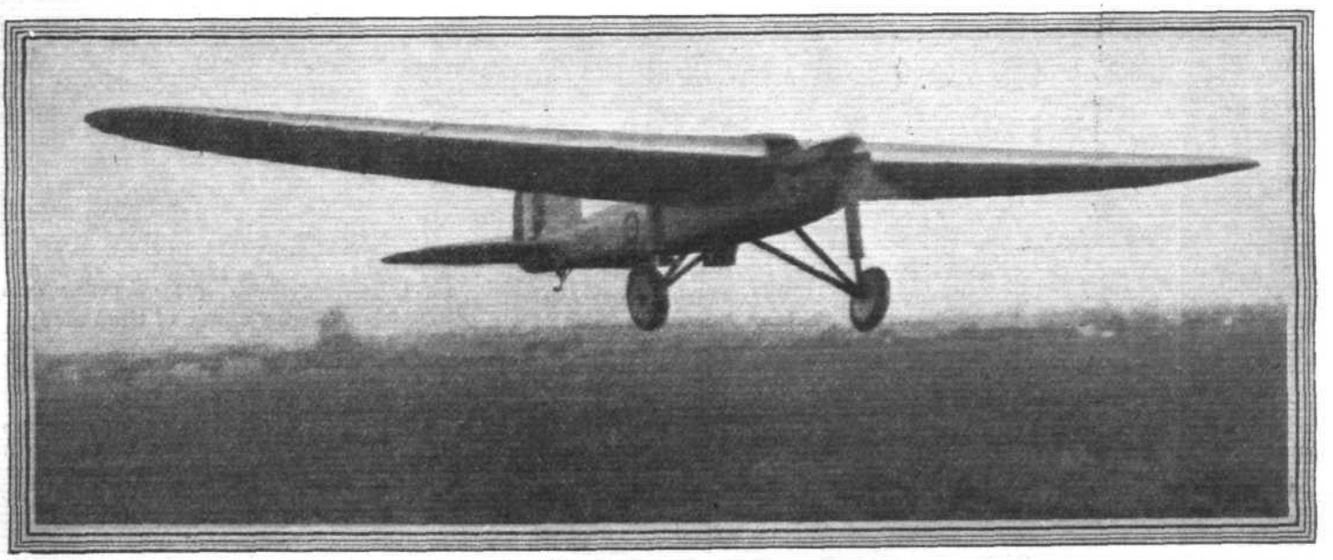
"An instrument has been evolved to ensure that if the machine goes off its course inadvertently, either vertically or directionally, a hooter sounds in the pilot's ear.

"Hot and cold drinks and an ample supply of food are carried in the cabin."

—— and Conjecture

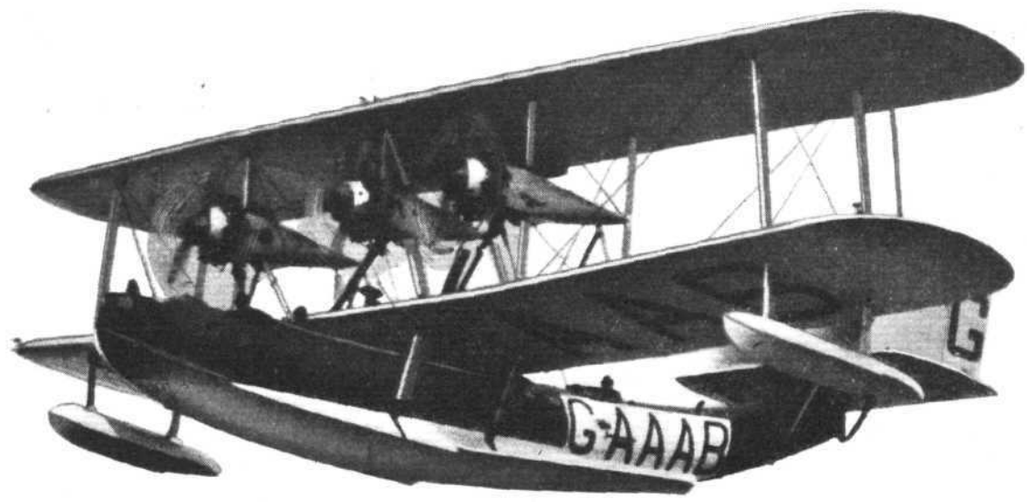
So much for the official notes. The Fairey monoplane is so extraordinarily interesting a type that it is difficult to refrain from speculating on its chances to beat the duration and distance records. That the chances are good there can be little doubt, as the Fairey Aviation Company is not likely to have failed to make very sure of their ground, but in the absence of official information on the subject it is very tempting to attempt the somewhat difficult task of forming an estimate which shall be somewhere near the actual facts.

The official figure for the amount of petrol carried is "more than 1,000 gallons." Accepting 1,000 gallons as being approximately the quantity of fuel, and knowing that the previous duration record without refuelling was 65 hours 25 mins., it is to be assumed that a duration of not less than 70 hrs. must have been aimed at. This would give an *average*



The Fairey Long-distance Monoplane in flight.

DOPED WITH



The illustration shows a Supermarine "Solent" —Jaguar Engines.

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MOTH NEWS FROM AFRICA

ROUND AFRICA BY MOTH 18,000 MILES TOUR

Lady Bailey in her Cirrus Moth has just completed the longest solo tour yet accomplished in a light aeroplane.

LONDON TO ASHANTI IN A MOTH

Captain R. S. Rattray in his Cirrus Moth lately flew from London to Ashanti. He wires, ". . . Moth perfect in climatic conditions ranging from snow and ice to 100° in shade."

THREE FLIGHTS BETWEEN LONDON AND CAPE TOWN IN A MOTH

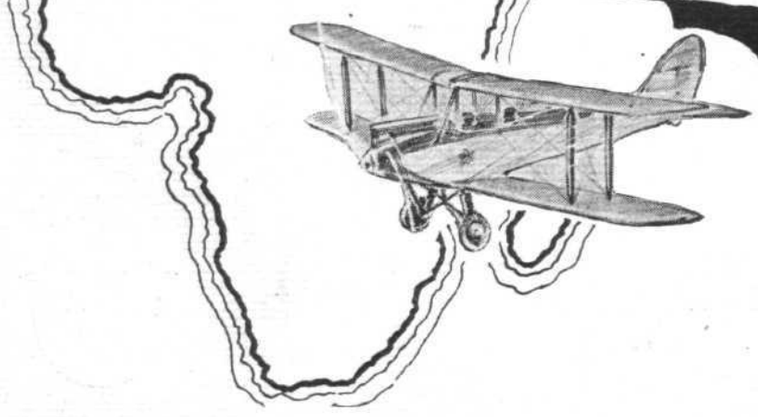
Lieutenant R. R. Bentley, flying his own Cirrus Moth, has made three trips between London and Cape Town.

PICTORIAL NEWS RUSHED HOME BY MOTH

Captain W. L. Hope followed H.R.H. the Prince of Wales' African Tour on behalf of a London newspaper. Total mileage, 13,000, in 23 flying days. The machine was a Gipsy Moth.

LONDON TO QUEENSTOWN IN A MOTH

Captain S. Halse has lately flown from London to Queenstown, near Cape of Good Hope, in a Gipsy Moth.



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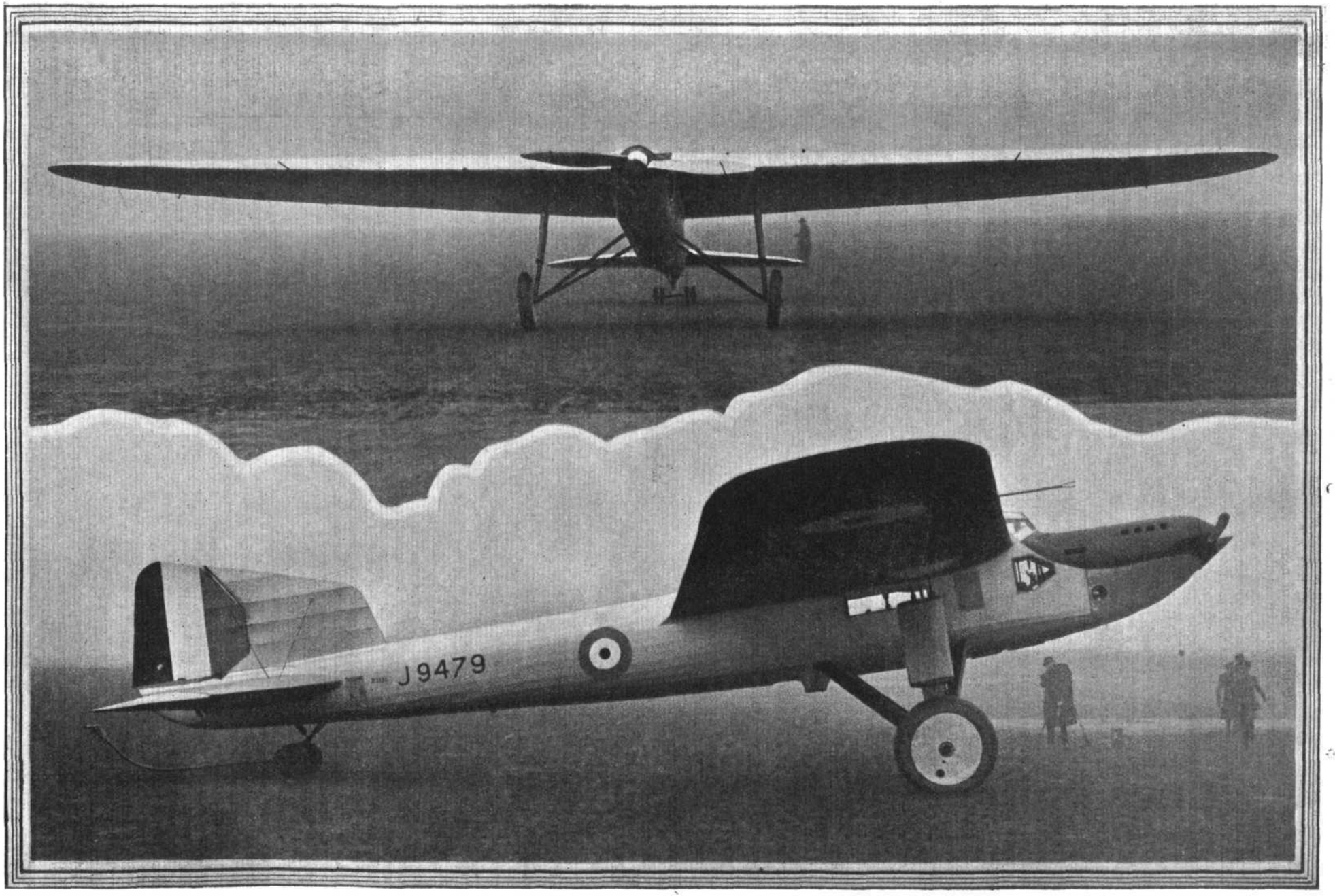


["FLIGHT" *Photographs*

"THE STREAMLINE AEROPLANE": Front and side views of the Fairey Long-distance Monoplane with Napier "Lion" engine. This machine is to make an attempt to beat the world's distance record shortly.

consumption of 14·3 gallons per hour. Obviously, while the machine is fully loaded the consumption will be greater than this and towards the end, when something like 7,000 lbs. weight has been lost by the consumption of nearly all the fuel, the hourly petrol consumption will be smaller.

The photographs of the Fairey monoplane which we publish this week disclose certain very obvious features in the design. Thus, the wing span, which is given as 82 ft., is obviously very large in proportion to the cross section of the fuselage. The mean chord is given as 11 ft., which would give a total wing area of 902 square ft. This is a very large area for a monoplane and probably indicates that although the power loading at the start may be fairly high, the wing loading most likely is not unduly high. It is, of course, a well-known fact that one may with reasonable safety employ either very high power loading or very high wing loading. It is when an attempt is made to make both the wing loading and the power loading high that difficulties in taking off are experienced. It seems likely that in this respect the Fairey monoplane should be in the fortunate position of being able to take off relatively easily with its full load on board, especially as the span loading and induced drag must be fairly low.

By placing the fuel tanks in the wing several desirable features have been attained. For instance, by this means it has been possible to keep the fuselage of quite small cross sectional area. The fuselage is, in fact, little more than a substantial beam carrying the tail surfaces and engine, and housing in the centre the crew of the machine. Thus, the Fairey monoplane must be regarded as having gone a considerable way towards the old Junkers ideal of the flying wing, *i.e.*, the machine in which crew, passengers, etc., are housed entirely in the wing, the fuselage and all other projections being suppressed. It is not claimed, of course, that there is no parasite drag on this machine, but it must be a much smaller percentage of the total than is found in the great majority of machines. What the minimum drag is cannot well be estimated with any degree of accuracy, unless one is in possession of a considerable number of data. In view of the very small proportion of fuselage to wing it seems quite possible that the Everling "high speed figure" is at least as high as, if not higher than, that of any machine of which we have data. Thus, for the De Havilland type "Tiger Moth," the Everling "high speed figure" is 26, which is a value well above the average. In all probability the figure for the Fairey monoplane is higher than that, but even if this figure is assumed we arrive, if a propeller efficiency of 75 per cent. at top speed is assumed, at a minimum drag coefficient of 0·014 in British "absolute" units. That this figure is not by any means an impossible one will be realised when it is pointed out that it corresponds to a power requirement of 378 propeller horse-power at 130 m.p.h. or at 75 per cent. efficiency, to a brake horse-power of about 500. In point of fact, there is good reason to believe that the drag of the Fairey monoplane is lower than that, and it is quite possible that its actual top speed is nearer 140 m.p.h.

However, it is not top speed that interests us so much as cruising speed. The Everling "distance figure" expresses ratio of lift to drag, multiplied by propeller efficiency. Usually, however, the optimum value of the "distance figure" cannot be found, as this requires a knowledge of the characteristic curves of the machine and the power developed by the engine at the best cruising speed. Consequently, the "distance figure" given in FLIGHT's descriptions of aircraft is nearly always that corresponding to top speed, and is thus often considerably lower than the optimum value. It seems likely that in the case of the Fairey monoplane the "distance figure" corresponding to best angle is at least 7, and in all probability it is more than that. But even assuming it to be 7 this would give a value of L/D of between 9 and 10, which is probably not overestimated.

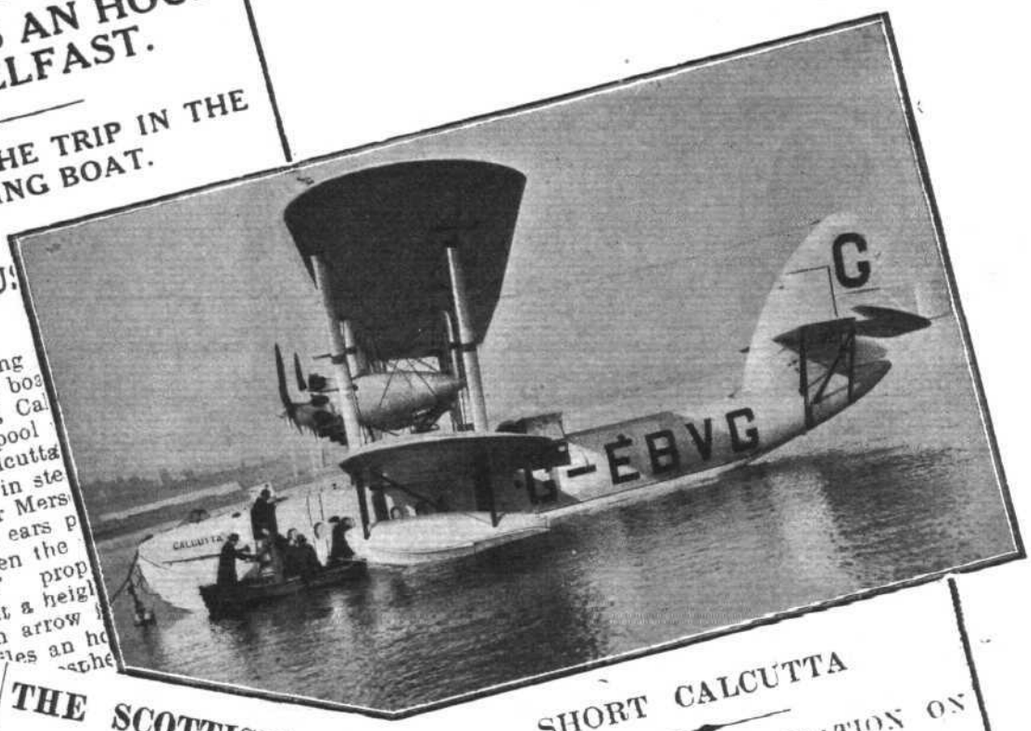
All these speculations, and they are admittedly little more than guesswork, appear to indicate that the Fairey long-distance monoplane should have a very good chance of beating the existing world's straight-line distance record. This, it may be remembered, is held by the Italian aviators Ferrarin and del Prete, who on July 3, 4 and 5 flew, in a Savoia-Marchetti S.64 monoplane with Fiat A.22 engine, from Rome to Touros in Brazil, a distance of 7,188·26 km. (about 4,460 miles). The same two aviators had, about a month previously, established a world's record for distance over a closed circuit by covering no less than 7,666·6 km. (about 4,750 miles).

The duration record of 65 hours 25 mins. is held by two German pilots, Ristics and Zimmermann, on a Junkers W.33 monoplane, with 280-h.p. Junkers L.V. engine. Although the two records have much in common, there are essential differences. For the duration record speed is of very small importance; for the distance record, however, speed is obviously an important factor, and here really "clean" aerodynamic design is a tremendous advantage. We have no actual knowledge of the data of the Fairey, but it appears to us that if it is indeed able to beat the duration record it should be even more favourably placed as regards beating the distance record by a handsome margin.

We have referred to the fact that placing the petrol tanks in the wing has several advantages. The reduction of the fuselage area has already been dealt with. The photographs of the machine indicate that the petrol tanks extend a considerable distance outboard. As at least half of the total loaded weight is constituted by the petrol, this placing of

An important item: The Napier "Lion" is extremely neatly cowled, as this view of the "nose" shows. Note also how windscreen merges into the top surface.

["FLIGHT" *Photograph*



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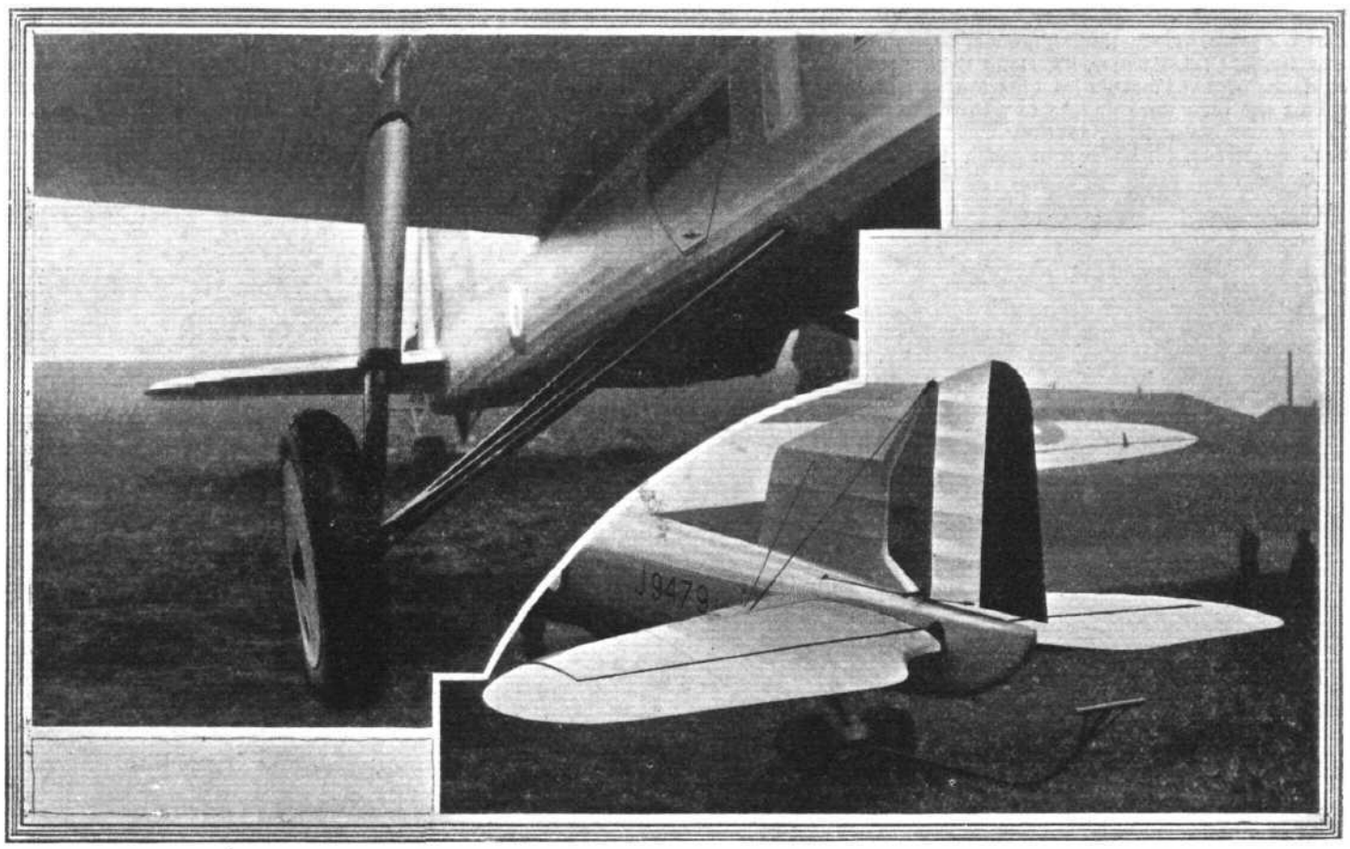
the tanks must have an important bearing on the weight of the wing structure. Not only does the distributed load relieve the stresses in the wing during flight, but the fact that more than half of the weight is outboard enables the telescopic struts of the undercarriage to be taken to the wing, and to support the petrol load direct when the machine is on the ground. In fact, the load transferred to the wheels from the fuselage must be relatively small, and thus a wide-track undercarriage with good ground stability becomes available very economically.

The careful streamlining everywhere is obvious, even from the photographs, and the placing of the wing in the style which recently the Germans have taken to designating "shoulder-decker" as distinct from a high-wing and low-wing monoplane, should result in reducing to a minimum the interference drag between wing and fuselage. Looking at the front view of the machine, one is struck by the fact that almost everywhere two or more members meet, they do so at a right angle, or at any rate at a large angle. Consequently it is to be assumed that the disturbance is less, and the interference drag smaller, than in a machine having many members meeting at narrow angles.

Concerning the Napier "Lion" engine, there is little to be said. Its reliability is proverbial, and doubtless the fuel consumption of the specially-tuned engine is very low indeed. We should hesitate to assume that it was this particular engine Captain Wilkinson was referring to the other evening at the Royal Aeronautical Society dinner when he mentioned a special engine with a consumption of 0·41 lb./b.h.p./hour at full power and 0·31 lb./b.h.p./hour at three-quarters full throttle, but it is, perhaps, permissible to infer that there is some connection between the two! If we accept the *average* consumption of the "Lion" fitted in the Fairey monoplane as being 14·3 gallons per hour for 70 hours, then an engine of this fuel economy would be able to develop an *average* power of about 323 b.h.p. for that duration on the 1,000 gallons of fuel. The official notes state that the machine carries "more than 1,000 gallons." We suspect it carries considerably more!

Altogether the effort is one of the most interesting made in British aviation circles for very many years, and we are personally optimistic of success whenever the machine goes for the Cape-London non-stop flight, which rumour has it may be attempted. The Fairey design is uncommonly clever, and the engine installed is reliable and economical. It would be difficult to imagine a better combination.



["FLIGHT" *Photograph*.

THE FAIREY LONG-DISTANCE MONOPLANE: The only place in the whole machine where members meet at a fairly small angle is near the wheel, shown on the left. The careful streamlining of the tail can be seen on the right. Note the "canoe stern." The tail plane can be trimmed, and is itself balanced so as to facilitate trimming.

◈ ◈

French Schneider Competitors

THE four French pilots chosen for the team in the next Schneider Trophy Race are M. Sadi Lecointe, M. Lasne, M. Bonnet and M. Demougeot, and four seaplanes are being constructed.

African Service Flight

THE annual R.A.F. flight from Cairo to Cape Town and back will commence on February 12. Co-operative exercises will again take place with the 3rd King's African Rifles at Nairobi. South African Air Force machines will join the flight at Pretoria and accompany it as far as Khartoum.

The Afghan Air Rescues

A R.A.F. TROOP-CARRIER flying between Peshawar and Kabul on January 29, made a forced landing in dangerous country. A smaller machine was sent out to render assistance. Another R.A.F. troop-carrier is thought to have reached Kabul for the purpose of bringing back Europeans to safety, although its failure to return has given rise to some anxiety. It is thought that possibly Sir Francis Humphreys, the British Minister in the Afghan capital, considered the return of the machine inadvisable.

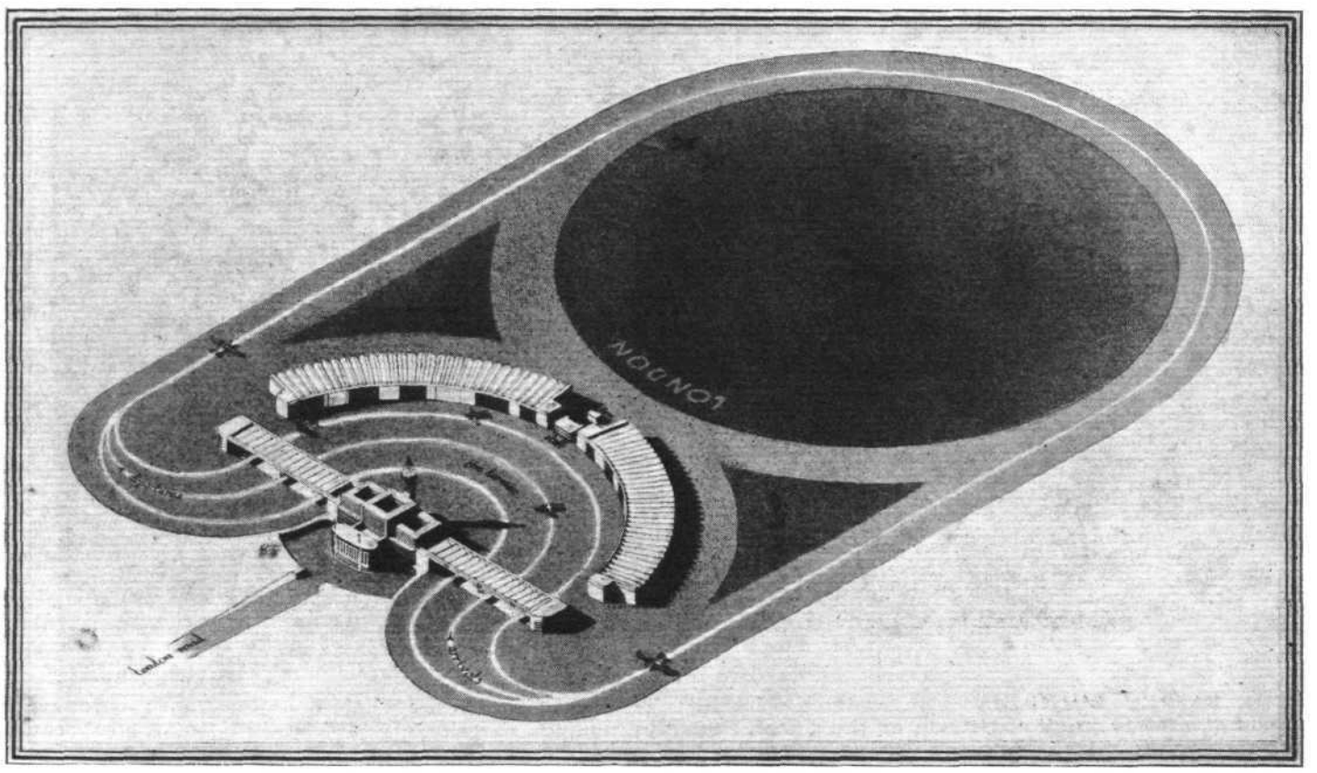
A Perilous Test

WHILE testing a new aeroplane at Dayton, Ohio, Lieut. J. B. Haddon, of the United States Army, lost consciousness at 32,000 ft. The machine fell 22,000 ft. before he revived; then soon after he had taken control again fire broke out. At 3,000 ft. he was obliged to leap with his parachute. He landed safely and merely suffered from slight shock after the two adventures.

THE FUTURE LONDON AIR PORT

UNDER the auspices of the Royal Institute of British Architects, a competition for the design of a future aerodrome has been held for prizes to the value of £200, given jointly by the directors of the Gloster Aircraft Co., Ltd., and Messrs. H. H. Martyn and Co., Ltd. In the preliminary contest there were 23 entrants, and ten of them were selected by the jury for the final contest. The jury comprised Sir Sefton Brancker, Mr. C. Cowles-Voysey, Mr. E. Vincent Harris, Sir Edwin Lutyens, Maj. R. H. Mayo, Mr. T. Tait, Mr. M. E. Webb, and Mr. G. E. Woods-Humphrey. It was considered that although no design was free from certain faults, those submitted by Mr. D. H. McMorran, 34, Butler Avenue, Harrow; Mr. M. Hartland Thomas, 10, John Street, Bristol; and Mr. L. C. S. Farmer, 97, Bollo Bridge Road, Acton, gave evidence of considerable imagination and original ideas.

But the jury were unable to award the first prize of £125 to any one competitor, so they decided to divide it equally between Mr. D. H. McMorran and Mr. M. Hartland Thomas, £62 10s. each; and to award the second prize of £25 to Mr. L. C. S. Farmer.



This is a photograph of Mr. Donald Hanks McMorran's plan of a future London air port, which shared the first prize in the competition carried out by the Royal Institute of British Architects for prizes offered by the Directors of the Gloster Aircraft Co., Ltd., and Messrs. H. H. Martyn and Co. Ltd., to stimulate the imagination of architectural students as to the influence of air development upon air ports.

The ten competitors were each given £5 for expenses and an opportunity of attending a lecture at the R.I.B.A. by Maj. R. H. Mayo, Consulting Engineer to Imperial Airways, Ltd., and visit Croydon. To assist them, plans of the lay-out of the Croydon aerodrome and the Tempelhof aerodrome, Berlin, were obtained from the Air Ministry to show alternative methods of arrangement today. The purpose of the competition was to suggest improvements.

Competitors had to design an aerial terminus for London 15 years hence. A purely hypothetical site was to be Mitcham Common, because it met the essential requirements as to flatness, distance from London and proximity of road and railways. It was assumed that the ground was suitable for any underground accommodation which might be desired by a competitor in his scheme, with rail access to London. As far as could be visualised at present the necessary requirements where passengers were concerned were ample and properly arranged landing grounds for the aircraft and approaches to the station. Vertical ascents or descents were not to be presumed. Efficient facilities for Customs, cloak rooms for both sexes with storing facilities, departure platforms, booking offices, car space close to a railway, a first-class hotel with 200 bedrooms and other suitable accommodation, and covered access for passengers from the aircraft to Customs, were other demands.

For the administrative section of the aerodrome the requirements were offices for Air Ministry officials, meteorological office, post, wireless and telegraph offices for administration and public, offices for five airway companies, one being British and therefore to include company administration and arrangements, a staff building containing a canteen, rest-room, etc., for about 50 pilots and 200 mechanics. The requirements for the technical side were assumed to be as follows:—

Hangars for large British aircraft, 67,000 sq. ft.; hangars for small British aircraft, 25,000 sq. ft.; hangars for foreign aircraft, 50,000 sq. ft.; hangars for private aircraft, 10,000 sq. ft.; space for mooring out aircraft in the open, 150,000 sq. ft.; garages for companies' cars, 3,000 sq. ft.; garages for private cars, 6,000 sq. ft.; workshops for British operating companies, 52,000 sq. ft.; accommodation for fire engines and first-aid, 500 sq. ft.; facilities for the supply of 40,000 galls. of petrol and 2,000 galls. of oil a day to various points in front of the sheds and mooring-out space.

Competitors had to submit a written report of not more than 1,000 words in the preliminary competition indicating the general line upon which they would base their design, accompanied by pencil sketches, illustrating it.

Mr. Donald H. McMorran, who shared the first prize, sent the following report with his preliminary sketches:—A terminal aerodrome consists of a flying ground, public space and storage of aircraft. The problem is to keep distinct the circulation of public and of aircraft, while providing suitable points of contact for embarking and disembarking. Further, to ensure rapid handling by maintaining a continuous forward movement in all operations.

The accompanying design represents the broad principles on which this problem can be solved, given the following limiting conditions:—(1) The general type of aircraft to be similar to that in use at the present time. (2) The size of site to be limited to about half a mile in width (that of suggested area available on Mitcham Common). (3) The nature of the scheme to be such that no prohibitive expenditure is entailed either as outlay or upkeep.

The AIRCRAFT ENGINEER

FLIGHT ENGINEERING SECTION

Edited by C. M. POULSEN

January 31, 1929

CONTENTS

EDITORIAL VIEWS.

Our subjects this month cover a fairly wide range, a fact which is to be welcomed as an indication of the increasing popularity of THE AIRCRAFT ENGINEER as a medium for the exchange of views and experiences.

Mr. Lower, who is a member of the Technical Staff of Short Brothers at Rochester, contributes an interesting article on the static stability of seaplane floats, explaining how tests can be conveniently carried out with model floats by those who, like Mr. Lower, are fortunate to work with a firm possessing a water tank. Most people, unfortunately, lack these facilities, and are thrown back on the Froude tank for their results. For all that, Mr. Lower's article is, we think, of considerable utility.

"Ethyl" is by now a fairly familiar young lady, but it is to be feared that the great majority have not bothered overmuch to enquire into her pedigree and antecedents. Consequently it will doubtless be of interest to many of our readers to study the article contributed by Mr. Tegner, of the Anglo-American Oil Company, dealing with metallic anti-detonants. Mr. Tegner discusses not only "Ethyl" but also several of her relatives, and he may be excused for being partial to the famous young lady, who has already done good work for aviation and may be expected to do still more.

In aviation we now have two ideals to strive for—Professor Junkers' "all-wing" machine, in which all parasitic bodies such as fuselage and undercarriage have been suppressed, and Professor Melvill Jones's ideally streamline aeroplane. At first glance it might be thought that the Cambridge ideal would be more easily attained than the Dessau one, but this is open to doubt. Dr. Junkers may, by going to very large sizes, succeed in producing an "all-wing" machine, or something very near it, before we learn how to avoid the eddy-making resulting from placing two separately and individually perfect streamline bodies in combination. For all that, Professor Melvill Jones has done aviation a great service by pointing out exactly how much power we are wasting by designing machines producing non-streamline flow, and our sins in this direction are brought home to us in a rather startling manner in the paper of which we publish extracts this month.

THE STATIC LONGITUDINAL STABILITY OF SEAPLANE FLOATS

By J. H. LOWER, A.F.R.Ae.S.

The longitudinal stability of seaplane floats, when at rest on the water, is of utmost importance; with high-speed racing craft, where the reserve buoyancy of the floats is reduced to a minimum, the question has to be given due consideration, but one is of the opinion that in the case of seaplanes used for commercial purposes the statical stability about a transverse axis through the centre of gravity of the machine is of even greater importance, especially if the machines are of only small or medium size, since moments are easily applied, perhaps without thought, by personnel standing on the stern of the floats.

Statical stability tests can be conveniently carried out with model floats, and in the following it is intended to describe a suitable apparatus and method of testing, and also to discuss some actual results which have been obtained.

Description of Apparatus and Method of Testing

Referring to Figs. 1 and 2, it is seen that the model floats are erected the requisite distance apart, to represent to scale the requirements of the full-size machine under consideration.

A framework A is erected above the floats in such a manner as to permit a rod at B, representing a transverse axis through the C.G. position of the complete machine.

The model is balanced about this representative C.G. position by means of lead weights on the framework A, and then attached to a vertical sliding frame C, through the connecting arms D, having ball bearings at the points of attachment to the rod B.

The frame C is free to slide vertically, by means of ball bearings, in the guides E, and with the model attached is supported over pulley wheels F by weights W.

The pulley wheels have ball-bearing centres and are attached to the rigid structure supporting the guides E.

If Δ is the total weight of the complete machine under consideration, and S the linear ratio of the model floats to full size, then the model displacement when at rest is :—

$$\Delta_m = \frac{\Delta}{S^3}$$

and if

ω_1 = weight of model + framework A + balance weights

ω_2 = weight of vertical sliding frame C

then $2W = \omega_1 + \omega_2 - \Delta_m$.

Moments to cause the floats to trim fore and aft about the transverse axis through the C.G. position can now be applied by moving a known weight a measured distance along the top

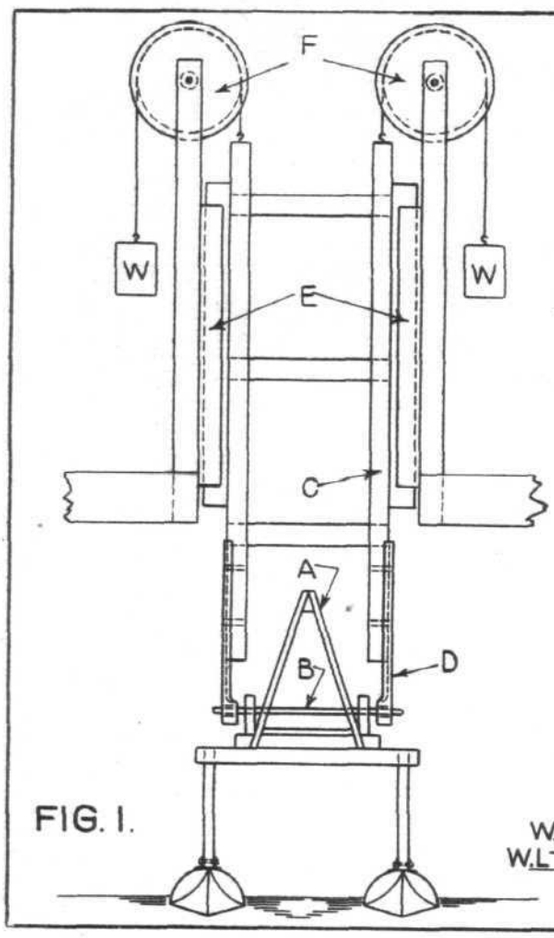


FIG. 1.

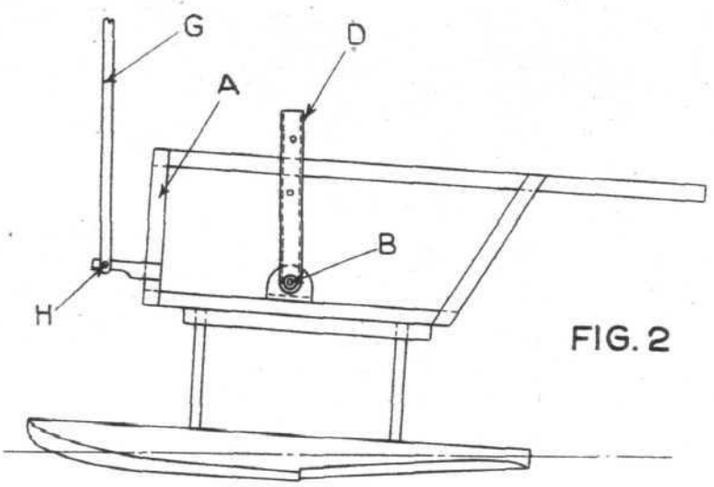


FIG. 2

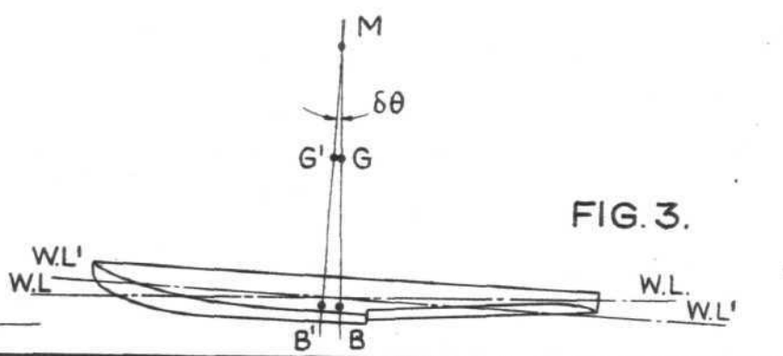


FIG. 3.

of the framework A, but care must be taken that the movable weight has first been accounted for in determining the true at-rest condition of the floats, since for obvious reasons the tests should be carried out under conditions representing constant displacement.

A rod G, pin-jointed at H, forms part of a parallel link apparatus for measuring the angle of trim with a certain moment applied.

If the moment is applied by a weight ω ounces acting at a distance d inches, then the equivalent full-size moment in foot-pounds is given by

$$(M)_\Delta = \frac{\omega.d.S.^4}{192}.$$

The applied moment can be usefully plotted against the resulting angle of trim of some known datum line on the floats.

Consideration of Results.

When a moment is applied to the floats by means of a weight ω acting at distance d, the position of the centre of gravity is virtually moved from G to G' (Fig. 3);

and

$$GG' = \frac{\omega.d.}{\Delta_m} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

where Δ_m is the total model displacement.

If a small moment $\delta(M)$ be applied, causing a small angular displacement $\delta\theta$, then

$$GG' = GM.\delta\theta.$$

Where GM is the metacentric height;
and therefore

$$GM.\delta\theta = \frac{\delta(M)}{\Delta_m}$$

$$\text{or } \frac{\delta(M)}{\delta\theta} = \Delta_m.GM,$$

showing that for small displacements in the angle of trim the slope of the "moment-attitude" curve plotted, enables the metacentric height to be calculated, and since this slope is given by tan θ where θ is the angular displacement, and

$$\tan\theta = \frac{GG'}{GM} \text{ for small angles,}$$

we have, by substitution in (1),

$$GM = \frac{\text{moment}}{\text{displacement} \times \tan\theta.}$$

It has been found convenient to convert the moment values obtained in any test, to represent a standard displacement for floats.

The writer has chosen a standard displacement of 1,000 lbs. for simplicity, and taken

$$(M)_{1000} = \frac{(M)_\Delta}{\left(\frac{\Delta}{1{,}000}\right)^{\frac{4}{3}}}$$

where

$(M)_{1000}$ = moment assuming standard displacement 1,000 lbs.
$(M)_\Delta$ = moment obtained for displacement "Δ" lbs.

Fig. 4 shows the curves resulting from a series of stability tests which have been carried out in the manner described, the models representing full-size displacements as given in the table following:—

Model.	Full-size Displacement represented. Lbs.
A	4,850
B	2,400
C	3,400
D	10,300
E	1,750
F	3,900
G	1,470
H	4,500
I	8,000
J	5,900

The at-rest angles of trim of the floats have been brought to a common origin 0°.

Each of the floats referred to has been built for actual

AIRCRAFT

The following aircraft are available

AIRCRAFT FOR THE SERVICES

The Armstrong Whitworth All-Steel Atlas 2-seater Fighter or reconnaissance machine, fitted with an Armstrong Siddeley Jaguar engine and wheels or floats.

The Armstrong Whitworth All-Steel Siskin 3.A. single seater Fighter fitted with an Armstrong Siddeley Jaguar engine.

The All-Steel A.W.A. 14 high performance Fighter fitted with an Armstrong Siddeley Jaguar engine.

AIRCRAFT FOR CIVIL PURPOSES

The Armstrong Whitworth Argosy. A 20-seater Airliner fitted with three Armstrong Siddeley Jaguar engines.

The Avro Commercial Monoplane. A 4-5 seater or 8-10 seater fitted with three Armstrong Siddeley engines.

The Avro-Avian. A 2-seater light aeroplane fitted with Cirrus or Armstrong Siddeley Genet engine.

AIRCRAFT FOR SCHOOL & CLUB PURPOSES

The Avro Gosport, fitted with Armstrong Siddeley Mongoose engine and either wheels or floats.

The Avro 504.N. fitted with Armstrong Siddeley Lynx engine and either wheels or floats.

The Avro-Avian, fitted with Cirrus or Armstrong Siddeley Genet engine.

SIR W. G. ARMSTRONG WHITWORTH AIRCRAFT LTD. COVENTRY

A. V. ROE & COMPANY LIMITED MANCHESTER

AERO ENGINES

The following air cooled engines are available

THE LEOPARD

The Armstrong Siddeley 700-750 *h.p.* 14-*cylinder Leopard* for carrying troops or torpedoes.

THE JAGUAR

The Armstrong Siddeley 450-500 *h.p.* 14-*cylinder Geared Jaguar* for Civil or Service requirements. Jaguar engines have been in service on the London Paris Airway for over three years.

The Supercharged 14-*cylinder Jaguar* is specially designed for maintaining power at high altitude.

Note.—The Armstrong Siddeley Geared Centrifugal Supercharger was the first device of its kind supplied to the Services and has now been in use for three years.

THE LYNX

The Armstrong Siddeley 215-225 *h.p.* 7-*cylinder Lynx* as used on the Amsterdam-Batavia, Munich-Milan and other airways.

THE MONGOOSE

The Armstrong Siddeley 130-140 *h.p.* 5-*cylinder Mongoose* engine for training work on land or sea.

THE GENET

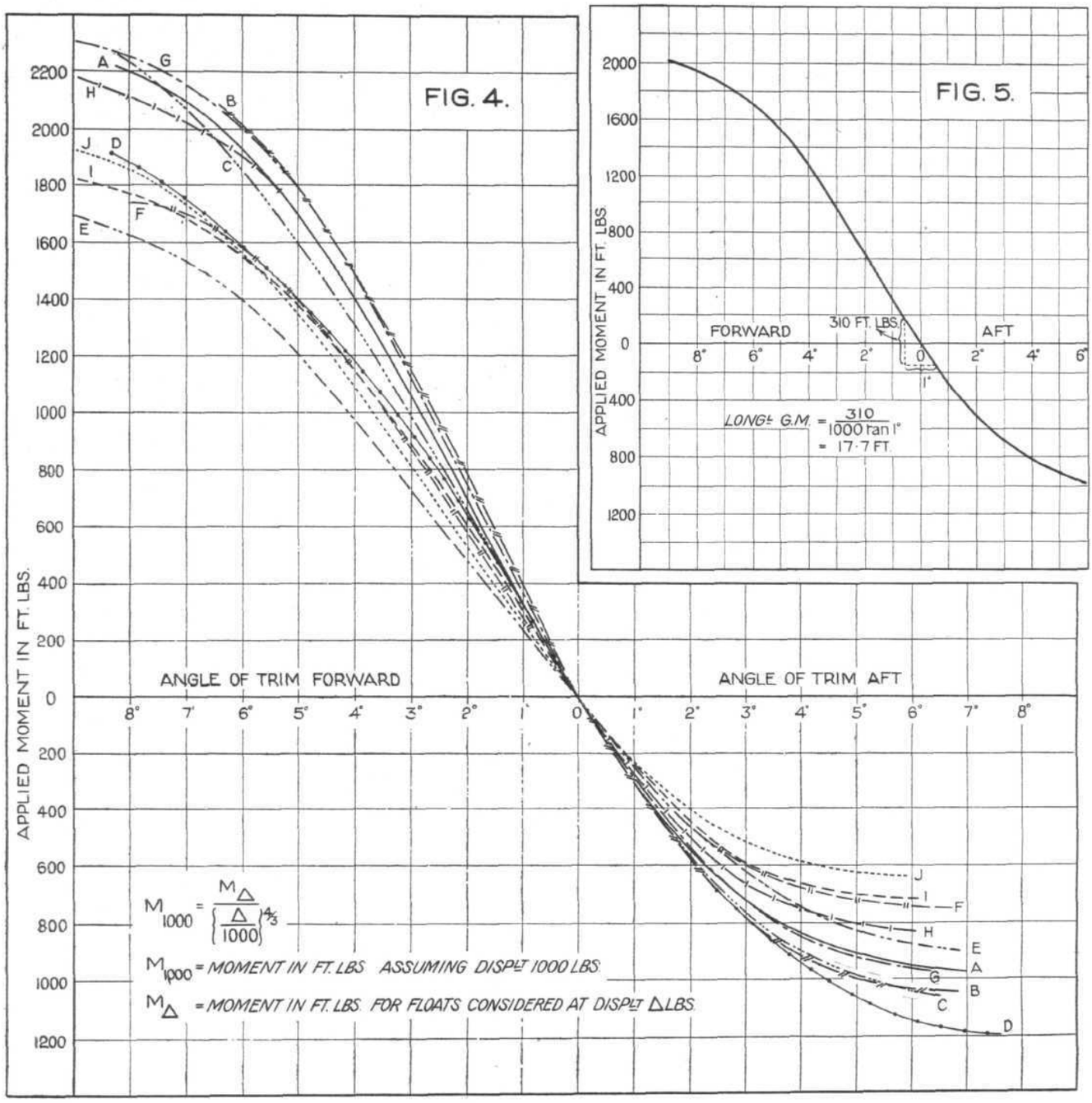
The Armstrong Siddeley 80-88 *h.p.* 5-*cylinder Genet*, an engine which is very much lighter than any engine in its class and is, therefore, particularly suitable for powering light aircraft.

ARMSTRONG SIDDELEY MOTORS LIMITED COVENTRY

ARMSTRONG SIDDELEY MOTORS LTD. are specialists in the highest class of light engineering work. In a model factory employing over 4,000 workpeople, they produce annually many thousands of motor-cars, hundreds of air-cooled aero engines and much special apparatus for H.M. Government. The quality, variety and quantity of work undertaken is a unique feature of this factory.

SIR W. G. ARMSTRONG WHITWORTH AIRCRAFT LTD. constructors and pioneers of all-steel aircraft, employ over 1,000 workpeople at Whitley, near Coventry. Here were designed and built the Imperial Airways' Argosies, the steel Siskins, Atlas and A.W.A. 14's for the Royal Air Force, and here, too, is a school for training pilots under the R.A.F. Reserve Scheme.

A. V. ROE & CO. LTD., the largest, most successful and most experienced designers and manufacturers of training machines in the world. These machines are produced in a large factory, specially constructed for the manufacture of aircraft, at Newton Heath, Manchester. At their works and aerodrome at Hamble, near Southampton, important experimental work for H.M. Government and other customers is undertaken.



Static "Moment—Angle of Trim" Curves for Standard Displacement of 1,000 lbs.

machines, and their degree of longitudinal stability when at rest on the water has been noted, with the result that it appears for reasonable stability, when converted to a standard displacement of 1,000 lbs., the limiting moments fore and aft should be about 2,000 ft.-lbs. and 1,000 ft.-lbs. respectively.

Fig. 5 is an average "moment-attitude" curve which has been prepared, showing that for a displacement of 1,000 lbs., the average metacentric height, $GM_{1000} = 17 \cdot 7$ ft., or for any displacement Δ,

$$GM_\Delta = 17 \cdot 7 \left(\frac{\Delta}{1{,}000}\right)^{\frac{1}{3}} = \underline{\underline{1 \cdot 77\ \Delta^{\frac{1}{3}}}}.$$

It is obviously seen that from two separate "moment-attitude" curves the same GM may be obtained, and yet the moments to cause instability fore and aft may be very different in the two cases.

As stated in the opening paragraph, the limiting moments aft are very important, and from the results discussed it would seem that a good average value for an at-rest displacement of 1,000 lbs., is 1,000 ft.-lbs.,

or for any displacement Δ lbs.

$$\text{Limiting moment aft} = 1{,}000 \times \left(\frac{\Delta}{1{,}000}\right)^{\frac{4}{3}} = \underline{\underline{\frac{\Delta^{\frac{4}{3}}}{10}}}$$

while the limiting moment forward $= \underline{\underline{\frac{2\Delta^{\frac{4}{3}}}{10}}}$

and such values should give satisfactory longitudinal stability for seaplane floats.

METALLIC ANTI-DETONANTS.

By H. S. TEGNER, B.A., A.M.I.A.E., A.M.I.P.T.

The true "knock" or "pink" is invariably due to "detonation" of the fuel, and should not be confused with mechanical noises due to loose motor parts. It should also be distinguished from pre-ignition, which occurs before the spark is fired, while true detonation always occurs after the spark is fired. Pre-ignition occurs when a hot spot is developed in an engine (usually the sparking plug) capable of igniting the charge without the supplied ignition equipment.

These hot spots may be produced by the overheating which occurs when the engine is knocking badly, so that we frequently have pre-ignition following true detonation. It is actually possible to run an engine for some length of time under these conditions without the use of the spark.

In 1915, the General Motors Research Laboratories, U.S.A., under Mr. C. F. Kettering, discovered that the Delco house lighting engine which was being manufactured by General Motors was difficult to instal in a great many homes because of the regulations laid down by the various State authorities as to the storage of gasoline in houses. General Motors discovered that by using kerosene in these engines, they got very serious trouble from knocking, and this caused Mr. Kettering to investigate the reason for this knocking. It can be quite well realised that unless General Motors could solve this problem they faced a serious loss in the sales of these engines.

Thomas Midgeley, Jnr., and T. A. Boyd, of the Research Department of this same concern, undertook the investigation in the General Motors Research Laboratories at Dayton, Ohio.

Midgeley and Boyd knew from previous research work that the addition of such substances as benzol and toluol to petrol achieved the result of suppressing detonation.

In this investigation, which involved incidentally the development of considerable instrumentation unknown at the time, many tentative theories of the cause of knocking were put forward, and one of these was that light, or radiant energy, played a part. This seemed particularly likely in view of the fact that an engine while knocking loses much more heat by radiation than it does during normal combustion. In testing this theory ordinary iodine (which absorbs light) was dissolved in petrol and tried in the engine, and this effectively removed the knock. It was soon discovered, however, that the effect of iodine was a characteristic of the element itself, since its colourless compounds were equally effective, and highly coloured dyes were quite without effect. This lead to a systematic study of different types of compounds, a study which finally involved classes representing more than 30,000 individual compounds. Among the early anti-knocks discovered, iodine and aniline were the two most important, but both of these are impracticable commercially, since iodine is too expensive and aniline has the disadvantage of limited solubility in petrol, together with a tendency to form gummy deposits.

After further exhaustive work on many varied chemicals the investigators put forward the following chemicals in their effective order of anti-detonating efficiency :—

	Rel. Effectiveness (Volume).
Aniline	11·45
Benzene	1·0
Toluene	1·093
Xylene	1·20
Alcohol	1·85
Ethyl Iodide	13·87
Xylidine	12·03
Tolendine	11·86
Tetraethyl Tin	20·4
Diethyl Selenide	62·5
Diethyl Telluride	250·0
Iron Carbonyl	250·0
Nickel Carbonyl	277·0
Tetraethyl Lead	628·0

It will be observed from the above table that tetraethyl lead is by far the most effective in anti-knock value.

A certain latitude must be allowed in the above figures as so many authorities have carried out their own experimental work and have endeavoured to apportion to various of the anti-knock compounds their various anti-knock values, and these results have varied considerably, therefore, the above figures must be taken as approximate.

The chief difficulty from the standpoint of commercial use of tetraethyl lead in petrol met with during Midgeley's preliminary experiments was the burning of tetraethyl lead to litharge in the engine, some of which accumulated on the plugs and valves and caused the plug to short very quickly, and the valves to stick.

Finally, it was discovered that it was possible to overcome this trouble by the addition of a halogen bearer which had the effect of combining with the litharge during combustion and forming a volatile compound which was thus ejected through the exhaust ports. Various halogen bearers were tried, the first among them being carbon tetra-chloride, but this proved objectionable, as it tends to throw down a white precipitate when mixed with tetraethyl lead and exposed to the atmosphere.

Another attempt to overcome this difficulty was made by the addition of tri-chlor-ethylene instead of carbon tetra-chloride, and for some time this was used in the ethyl-fluid which was sold to the public through special containers attached to the road-side petrol pumps.

The halogen bearer now being used is ethylene-dibromide, and this has proved in every way successful, the resulting deposit in an engine using ethyl-treated petrol being even less injurious than ordinary carbon, in fact it is claimed that the traces of lead bromide in and on the cylinder walls have a beneficial effect in that they increase smoothness of the sliding surface by filling up the microscopic voids in the cast-iron and act in very much the same way as a graphite lubricant.

Owing to the scarcity of supplies of bromides, a search for a suitable source of these compounds was instituted by the chemists of the Ethyl Gasoline Corporation and the General Motors Research Corporation. They eventually turned to sea water, for while there is only one pound of bromide in 1,700 gallons of sea-water, there is a lot of sea-water, so that if the bromide could be recovered the supply would be inexhaustible. A process was eventually developed, and with the aid of the Du Pont Company a vessel, the ss. *Harming*, was purchased from the Government and fitted up as a floating chemical plant. The ship was re-christened the ss. *Ethyl* and put to sea for a trial trip. The trip was a rough one, and the chemists on board proved to be poor sailors, so the ship returned with several sharks and only 7 barrels of bromide, but the net result showed that it is possible, and probably practical, to recover bromides from sea water if other supplies fall short.

At the present moment supplies of ethylene-dibromide have improved, and this is adopted for use with tetraethyl lead for use in petrol.

Reverting once more to iron carbonyl, previously mentioned in the table of antidetonating efficiencies. Iron Penta-carbonyl $Fe(CO)5$ was in the year 1891 discovered, practically simultaneously, by Mond, Quincke, and Bertholet. Production, however, offered difficulties, and the yield was very poor, so for many years this new product remained a chemical rarity.

In the year 1922 even R. L. Mond, Junr., reported that it was indeed comparatively easy to produce some cubic centimetres, but that, on the other hand, it was impossible to obtain larger quantities.

When, during the search at the Baden Anilin Soda Works, Ludwigshafen, for an antiknocking medium, the adaptability of iron carbonyl for this purpose was under observation, and extensive tests were also made to discover a technical process for the production of this liquid. Favoured by the comprehensive and varied experience gained there from the Haber-Bosche Ammonia Process, of working with high pressures, it was possible to overcome all difficulties in a very short time and to produce iron carbonyl in quantities sufficient to refine all the petrol used in Europe and convert it into a "knocking-free" product.

Iron pentacarbonyl is a yellowish red liquid with a specific gravity of 1·45, boiling at 103° C., and solidifying at minus 21° C. It is miscible with most organic solvents and with petrol under all conditions. It is a perfectly stable body when it is protected from the light; in sunshine decomposition slowly sets in—decomposition is negligible in diffused light, whereby the iron nona-carbonyl separates out into golden yellow crystals. In darkness it can be stored without loss.

Iron carbonyl mixed in equal proportions with kerosene oil is termed "Motyl." "Motyl" when added in the proportion of half a gallon to 100 gallons of petrol, or 0·5 per

cent., is sold in Germany to-day under the trade name of "Motalin," for use in high compression engines. Unfortunately iron carbonyl as an antidetonant has several disadvantages which, up to date, have not been overcome, the major one is that the sparking plugs are affected by an accumulation of iron oxide on the insulators which results in shorting. In the case of tetraethyl lead the halogen bearer results in the production of a volatile lead compound which is readily expelled from the cylinder through the exhaust ports, no such equivalent has yet been discovered for iron carbonyl, and thermo-dynamic investigation suggests that there is little chance of so doing.

Nickel carbonyl is another efficient antiknock of the metallic compound group. However, here again there are serious disadvantages in its use which have so far not been overcome. Firstly, the cost is high and $2\frac{1}{4}$ times as much nickel carbonyl by volume is required as is of lead tetraethyl to achieve similar results. Secondly, the resulting deposits in an engine using a nickel-treated petrol are deleterious, they being of a hard gritty nature which, of course, would cause excessive wear and tear in the engine. No chemical reagent has as yet been found to alleviate this trouble in use. Also nickel carbonyl is extremely unstable.

It is a curious fact that all very effective antiknocks are poisonous, nickel carbonyl, iron carbonyl and tetraethyl lead being of the same order in this respect. In fact, someone has defined an antiknock as a substance which is "expensive to make and poisonous."

One other antiknock compound not mentioned is thallium; a British patent has been granted to the Asiatic Petroleum Co. Ltd., and Mr. A. C. Egerton for this invention.

Several methods are suggested in this patent to utilise thallium or a compound thereof to prevent detonation, one of them being to introduce by some means a vapour of thallium into the cylinder.

From a practical point of view it is rather doubtful whether any great measure of success is likely to be met with by the use of thallium as an antiknock, the difficulties of the method of application being far from easy to overcome.

The Dupont Chemical Corporation, at Wilmington, Del., are manufacturing tetraethyl lead under very strict supervision and with entirely adequate equipment. Medical examination of the personnel is insisted on and closely adhered to.

The plant is of the most up-to-date type and ventilation is as nearly perfect as possible. At the present moment this product is turned out in considerable quantities with absolutely no risk or trouble. In 1925 the daily output was 1,000 gallons of tetraethyl lead per day, and 1 gallon is sufficient to treat 1,500 gallons of petrol. During the last two and a half years no poisoning has occurred among employees in the tetraethyl lead plant.

The manufacture of tetraethyl lead is as follows: Lead and sodium are smelted together to form a lead sodium alloy which is pigged and crushed to a coarse powder. The powdered alloy is then put into autoclaves with heat control, and gaseous ethyl chloride passed over it, the resultant products are crude tetraethyl lead ($PbEt_4$) and sodium chloride.

The liquid tetraethyl lead is drained off and steam distilled, the vapour being caught and condensed. The distilled tetraethyl lead is then passed through to storage tanks. The filtered tetraethyl lead is then blended with ethylene-dibromide and halowax oil which has the distinctive red analine dye dissolved in it. The blended fluid is then filled into drums, the filling being conducted in draught chambers to prevent escape of vapours and the hose lines all carry canvas bag filters.

The concentrated ethyl fluid is now made in one mixture, consisting of 54·5 per cent. tetraethyl lead, 36·4 ethylene dibromide and 9 per cent. halowax oil. The specific gravity is 1·79 at 20° C. It is entirely soluble in petrol and does not settle out.

The fluid is poured into 50-gallon steel drums, very carefully sealed and shipped from the factory at Wilmington to the refineries of the various oil concerns.

At each of these refineries is erected a bulk blending mixer, which device automatically mixes the fluid with the petrol in proper proportion, delivering straight into a large storage tank without allowing the concentrated fluid ever to come in contact with the air.

The United States Airships "Shenandoah" and "Los Angeles" with Packard and Maybach aero engines respectively, used a mixture of aviation petrol with 8 cc. and 11 cc. of ethyl fluid per gallon.

For any long distance flights, such as the Honolulu flight on PN9 machines, ethyl fluid was carried in small steel containers so that the fuel picked up en route could be properly treated to give it the necessary antiknock value.

Capt. Mackintosh and Mr. Hinkler, during their recent non-stop flight attempt to India, adopted this latter method in case of forced landing where suitable fuel would not be procurable.

The United States Naval Air Service think very highly of this fuel, and it is used to a large extent in their standard aircraft.

It is by now quite well known that the British entries for the 1927 Schneider Cup air race were using concentrations as high as 10 cc. of ethyl fluid per gallon of aviation and benzol.

The British Air Ministry and the Bristol Aeroplane Company, have done now a considerable amount of experimental work; however, the results obtained are not as yet procurable for publication, although it has been intimated that they are of a satisfactory nature.

At one time it was believed that there was a limit to the quantity of fluid which could be added to a gallon of petrol without giving trouble, but later experiments seem somewhat to refute this opinion, it now being possible with careful manipulation of various spirits and various concentrations of this fluid, to achieve excellent results in very high compression engines, ratios as high as 9·5 to 10 : 1 having been used successfully. However, these higher concentrations are not advisable or necessary for the average automobile engine. 3 cub. cm. of tetraethyl lead per gallon of motor spirit is considered ample for ordinary purposes. Compression ratios as high as 6·5 to 1 can be used quite satisfactorily on this blend. These latter remarks are of necessity subject to considerable latitude, especially as ordinary petrol varies very considerably in its antidetonating qualities.

IN THE DRAWING OFFICE.

DETAIL STRESSING.

By H. PARKINSON, A.R.Ae.S.I.

Since the innovation of all-metal construction, designers have been, and still are, faced with an increasing number of "aristocratic" metals which necessarily have varying stress figures and therefore require individual consideration. In the D.O. where the major portion of detail stress work is carried out, the draughtsman, in personal experience, prefers to do his figure juggling through the medium of tables arranged on a labour- and time-saving basis.

The following table is computed for an hypothetical material having stress values of: fb = 10 tons □ ins., ; ft = 10 tons, □ ins. ; fs = 10 tons, □ ins. ; and is arranged such that for any given material the fb, fs and ft values, within the limits enumerated, may be obtained by a simple proportion of required and hypothetical stress-values.

Example 1.

Required: shear and tensile strength of $\frac{1}{2}$-in. diameter M.S. bolt.

For M.S.: fs = (say) 25 tons, □ ins.: ft = (say) 30 tons □ ins.

From table, fs or ft = 4,398 lbs.

fs $\frac{1}{2}$-in. diameter M.S. bolt $= \frac{25}{10} \times 4{,}398 = 10{,}995$ lbs.

ft $\frac{1}{2}$-in. diameter M.S. bolt $= \frac{30}{10} \times \quad 398 = 13{,}194$ lbs.

Similarly, for a material of ft = 55 tons □ ins. :—

ft of $\frac{3}{8}$-in. bolt = $\frac{55}{10} \times 2{,}474 = 13{,}607$ lbs.

Example 2.

Required : Bearing strength of $\frac{5}{8}$-in. steel bolt in 18 S.W.G. Duralumin.

fb = (say) 25 tons □ ins.

from table fb = 672.

$fb = \frac{25}{10} \times 672 = 1{,}680$ lbs.

Similarly, for a material of fb = 70 tons □ ins. :—

fb of $\frac{7}{16}$-in. bolt in 12 S.W.G. = $\frac{70}{10} \times 1{,}019 = 7{,}133$ lbs.

The last column, under ·10 ins., is useful for obtaining bearing strength in any thickness, *e.g.*, for a thickness of 0·28 ins., required figure = 2·8 × constant.

In practice, the calculations are made purely by inspection of chart and use of slide rule : the following through of the example, being, of course, unnecessary.

ft = 10 tons □ ins. fs = 10 tons □ ins. fb = 10 tons □ ins.

Dia. in.	fs or ft in lbs.	fb in lbs. (Standard Wire Gauge).							
		24	22	20	18	16	14	12	10
$\frac{1}{16}$ ..	68·8	30·8	39·2	50·4	67·2	89·6	112	145	140
$\frac{3}{32}$ ..	154	46·2	58·8	75·6	101	134	168	218	210
$\frac{1}{8}$ ..	275	61·6	78·4	101	134	179	224	291	280
4 B.A. ..	354	70	89	114	153	204	254	331	316
$\frac{5}{32}$ ..	429	77	98	126	168	224	280	364	350
2 B.A. ..	602	91	116	149	199	265	332	431	414
$\frac{3}{16}$ ..	618	93	118	151	202	269	336	437	420
$\frac{1}{4}$ ..	1100	123	157	202	269	359	448	583	560
$\frac{5}{16}$ ..	1718	154	196	252	336	448	556	728	700
$\frac{3}{8}$ ..	2474	185	235	302	403	537	672	873	840
$\frac{7}{16}$ ..	3367	216	274	353	470	627	784	1019	9800
$\frac{1}{2}$ ..	4398	246	314	403	538	717	896	1165	1120
$\frac{9}{16}$ ..	5566	277	353	454	605	806	1008	1310	1260
$\frac{5}{8}$ ..	6872	308	392	504	672	896	1120	1456	1400
$\frac{11}{16}$ ..	8315	339	431	554	739	985	1232	1601	1540
$\frac{3}{4}$ ..	9900	369	470	605	806	1075	1344	1747	1680
$\frac{13}{16}$ ..	11,614	400	509	655	873	1165	1456	1893	1820
$\frac{7}{8}$ ..	13,470	431	548	705	940	1254	1568	2038	1960
$\frac{15}{16}$ ..	15,462	462	587	755	1008	1344	1680	2184	2100
1 ..	17,592	493	627	806	1075	1434	1792	2330	2240

LECTURES AND PAPERS

THE STREAMLINE AEROPLANE.*

Of the two papers which Prof. Melvill Jones presented to the Royal Aeronautical Society (the printed copy and the one actually delivered) the latter was undoubtedly the more interesting. Prof. Melvill Jones has the uncommon gift of communicating knowledge without the audience being aware that it is being "tutored," and throughout his lecture the interest of all present never once flagged. Col. the Master of Sempill was in the chair, and mentioned that probably the valuable work done by Prof. Melvill Jones was inadequately known. He hoped to be able to give some details at a later date, which would be published in the Society's *Journal*.

Space does not permit of giving Prof. Jones' paper in full, but the following extracts and summaries should at least serve to give an idea of the general reasoning and conclusions. The lecturer said he had for years been annoyed by the gap existing between the power actually expended on mechanical flight and the power ultimately necessary. Everyone had a more or less clear idea of what an aeroplane should look like : a kind of albatross with one or two pairs of wings—depending on whether one lived in Germany or Britain—and in their more sanguine moments they even saw the wings without the albatross. But progress towards that ideal, as far as general purposes aircraft was concerned, was painfully slow. "It has seemed to me," the lecturer continued, "that a contributory factor to the slowness of this evolution has been the lack of any generally understood and easily visualised estimate of what could be achieved, were the difficulties in the way of realising the ideal form overcome. There is a natural tendency to decide on one day that the gain, say, 20 per cent. on the total drag, or 7 per cent. on the speed, to be had by spending endless trouble on improving the undercarriage design, is not worth the trouble ; on the next day to come to a similar conclusion about the drag of the engine cooling apparatus ; on the next day about the wires, struts and minor excrescences ; and on the next about the pilot's view ; omitting to notice that if all the improvements were made at once the total gain would not be some insignificant percentage of the whole, but might reduce power consumption to a small fraction of its original value and so extend the range and usefulness of the aeroplane into realms which would otherwise be unattainable." Before commencing the technical part of his paper, Prof. Melvill Jones stated that the formula which he had arrived at was so simple that it might seem a waste of time to put it before the Society, but, he said, "if you had had the job of putting a theoretically leaky argument such as this before a body of scientists, who are of necessity more concerned with detecting fundamental errors in reasoning than in devising engineering approximations, you would understand why I have gone to some trouble to expose, as precisely as I am able, the assumptions upon which the final conclusion is reached."

It was now possible to isolate from the whole power required for flight that part—the power to overcome induced drag—which was expended in supporting the weight on a finite span. This induced power, as it might be called, depended primarily on "span loading," *i.e.*, weight/span^2. For biplanes of reasonable proportions the induced power per 1,000 lbs. weight could be expressed as $2{\cdot}80\ \overline{\omega}/\sigma V m$ where Vm was the speed, with 100 m.p.h. as the velocity unit σ was the ratio of the air density to that of standard air, and ω the span loading in pounds per square foot. Assuming an airscrew efficiency of 75 per cent., an average span loading of 2·2 and making σ equal to unity, the following table could be compiled for b.h.p. required for the induced power in a normal biplane :—

Induced b.h.p. per 1,000 *lbs. weight*

Speed, m.p.h.	For induced drag.	Total normally supplied.	Induced power. / Total power. Per cent.
90	9·1	35	25
100	8·2	45	18
120	6·8	75	9
150	5·5	120	5

"Since no great power reductions are to be obtained, either by improving the airscrew efficiency or by reducing 'induced power,' it remains to examine the possibility of reducing that part of the head resistance which arises merely because the aeroplane is being dragged through the air, without reference to the fact that it must support its own weight. This part of the whole drag is described as the sum of the wing profile drag and the parasitic drag. The power required to overcome it lies between 75 and 95 per cent. (according to speed) of the total power applied to the modern general purposes aeroplane. Any serious reduction in this item will, therefore, have an important influence on the total head resistance."

"An ideally streamline aeroplane may be defined as one which : (*a*) Generates a flow identical, except in a very thin 'boundary layer,' with the flow of an inviscid fluid ; (*b*) Experiences a pressure distribution identical with that due

* Paper read before the Royal Aeronautical Society by Professor B. Melvill Jones, A.F.A., M.A., on January 10, 1929.

theoretically to the inviscid fluid; and therefore (*c*) experiences a drag which is the sum of the induced drag and the tangential, or skin friction, forces resolved in the down-wind direction.

"Like all ideals, the ideally streamline aeroplane cannot exist; the boundary layer must have some thickness, so that the flow cannot be exactly the same as one in which there is no boundary layer. With the very high Reynolds' numbers typical of aeronautical practice the approximation for a good streamline body is very close."

Pointing out that unless bodies are very carefully shaped, they do not necessarily generate streamline flow, but shed streams of eddies from various parts of their surface, such eddies representing expenditure of power, the lecturer stated that the power absorbed by the eddies might often be many times greater than the sum of the powers absorbed by skin friction and induced drag. The drag of a real aeroplane, therefore, exceeded the sum of the induced drag and skin friction drag by an amount which was a measure of defective streamlining. Having arrived at the conclusion that the drag of the ideally streamline aeroplane was the sum of the induced and skin friction drags, the next step was to estimate the magnitude of these drags. While induced drag could be estimated with good accuracy, no corresponding theory yet existed for the estimation of skin friction on curved surfaces such as those of the wings and body of an aeroplane. Some empirical method of investigation, therefore, had to be adopted.

Experiments on flat plates made at Göttingen some years ago, led to the formula $k_F = 0{\cdot}019\ R^{-0{\cdot}15}$, where k_F, the skin friction coefficient, stands for (skin friction)/$\rho V^2 E$ and R stands for $\rho Vl/\mu$, where V represents the relative velocity of air and plate, E the total exposed area of *both* sides of the plate, l the length of the plate in the wind direction, and ρ and μ the density and viscosity of the air. R is thus the Reynolds' number involving the dimension parallel to the wind direction. The expression relates to the conditions when the "boundary layer" is turbulent over the greater part of the plate. When the Reynolds' number is small, the smooth region extends over the whole plate, and the skin friction drag has, in these circumstances, been shown to agree closely with the expression $k_F = 0{\cdot}66\ R^{-0{\cdot}5}$. A slide was shown in which the lecturer had plotted curves representing these two expressions, as well as calculated transition curves from one to the other, on the assumption that the critical change from smooth to turbulent boundary layer occurs when the Reynolds' number has certain arbitrarily selected values, *e.g.*, 10^5, 5×10^5, and 10^6.

Professor Melvill Jones continued his lecture by going from flat plates to streamline bodies, and pointed out that our precise knowledge of the drags of very good streamline bodies other than the flat plate is confined to results of wind tunnel tests on solids of revolution and on isolated wings. The former, when moving axially, exert no lift, and consequently their drag, if they are streamline, should be entirely due to skin friction; the latter, when they exert lift should, if streamline, experience induced drag as well as skin friction drag. "My first concern," the lecturer continued, "was to determine to what extent the drag of the better known streamline solids of revolution and the profile drag (total drag minus induced drag) of the better known wings, could be estimated from the known skin friction on a flat plate."

Slides were then shown, of which one referred to wing sections and the other to solids of revolution. The profile drag of the wings and the drag of the solids of revolution were expressed in the form: $k_F = (\text{drag})/\rho V^2 E$, where E is the total exposed area (calculated for simplicity as twice the conventional area in the case of wings, and three-quarters of the area of the circumscribing cylinder in the case of solids of revolution). This coefficient was plotted against $R = \rho Vl/\mu$ where l is the maximum dimension parallel to the wind, *i.e.*, the "length" of the solids of revolution and the "chord" of the wings. For comparison, curves were also plotted representing the same coefficient k_F for the flat plate.

Expressing as the "equivalent plate" a thin flat plate of the same total exposed area as the solid shape, and of length parallel to the wind equal to the length in this direction of the solid, the information contained in the slides was summarised as follows:

"When the thickness of the wing is less than 8 per cent. of the chord, the profile drag is less than that of the 'equivalent plate.' This includes nearly all wings used in Britain before some two or three years ago.

"Up to a thickness of 12·5 per cent., the profile drag is within some 10 per cent. of that of the 'equivalent plate.' This includes the great majority of wings used in Britain at the present time.

"Thicker wings, up to 15 per cent. to 20 per cent., apparently have higher profile drag coefficients-between, say, 15 per cent. and 50 per cent. greater than the 'equivalent plate,' according to shape and place of test."

Results of wind tunnel tests on models of airship hull shapes indicated broadly that as the Reynolds' number increases towards the extreme limits of atmospheric tunnels, the skin friction coefficient moves to slightly below that of the "equivalent plate." The lecturer expressed the opinion that at "full scale" all chance of a smooth boundary layer will have vanished and the drag coefficient will have definitely moved to the upper curve (*i.e.*, that expressed by the first equation). He noted that all tests made on solids of revolution of good streamline shape and fineness ratio greater than 4 showed drags which were not appreciably greater than those of the "equivalent plate" with turbulent boundary layer.

Turning to the subject of combinations of shapes, Professor Melvill Jones said that such little information as is available suggests that combinations, or minor distortions, can be made without appreciable increase of drag, provided we know how to make them. It was, therefore, reasonable to suppose that complex bodies such as aeroplanes could, given sufficient knowledge and structural ability, be made to have a drag no greater than the sum of the induced drag and the drag of the "equivalent plate."

If the drag of the streamline aeroplane is simply the sum of the induced drag and skin friction drags, the power required to tow it would be obtained by multiplying these drags by the forward velocity V. Let I and F be the powers required to overcome induced and skin friction drags respectively. If the aeroplane is towed by an airscrew of efficiency η, effectively isolated from it so that there is no interference, then the b.h.p. required to drive the screw will be $(I + F)/\eta$ Making certain assumptions, the lecturer arrived at the conclusion that to a first approximation the b.h.p. required to propel a *streamline* aeroplane should not be seriously influenced by interference, provided that the interference does not cause the flow to cease being streamline. We cannot afford the space to deal in detail with Professor Jones' arguments, but as he pointed out, the errors introduced by this assumption are so small by comparison with the other factors considered that they do not seriously affect the final conclusions to be drawn.

The general conclusion of the lecture can be stated as follows: The b.h.p. required to propel the streamline aeroplane horizontally may be estimated as $(F + I)/\eta$, where η is the efficiency to be expected from an isolated screw performing the service required; F is the power expended in skin friction, taken for the present to be that required to propel the equivalent flat plate; I is the induced drag. As a first approximation F and I may be estimated for the aeroplane isolated from the screw. When the streamline aeroplane is climbing the expression must include another term C, equal to the product of the weight and rate of climb. The formula then becomes: b.h.p. $= (F + I + C)/\eta$. It remains to give numerical expression to the symbols F, I, C, and η. The estimation of I presents no difficulty. A simple formula is $I = 2{\cdot}80\bar{\omega}/\sigma V_m$ horse-power per thousand pounds weight with span loading $\bar{\omega}$ in pounds per sq. ft., and V_m measured in hundred-mile-per-hour units. This formula applies strictly to a biplane of normal gap and aspect ratio of rectangular plan form, but is easily modified to apply to a monoplane or biplane of any desired gap and aspect ratio.

The skin friction power F depends upon the skin friction coefficient $k_F = (\text{skin friction force})/\rho V^2 E$, and before F

can be estimated some value of k_F must be adopted. To be on the safe side, the lecturer suggested for the present the use of an overall value of k_F of 0·002, which he thought would leave a little in hand to allow for using moderately thick wing sections, say, up to 12 per cent. of the chord. Using this figure for k_F, the value of F becomes: $F = 0 \cdot 002 \rho V^3 E$ foot pounds when V is in feet per second, and $F = (27\sigma V^3_m E)/W$ horse-power per 1,000 lbs. weight, where V_m is in hundreds of miles per hour units, E is the exposed surface in square feet, and W is the weight of the aeroplane in pounds. Finally, the climb power C is given by $C = 0 \cdot 030\ V_c$, where V_c is the rate of climb in feet per minute.

Finally, Professor Melvill Jones showed some slides giving curves of power required for the streamline aeroplane and for existing commercial types. For the purpose of calculating the former he had taken $E = 3 \cdot 2S$, where S is the conventional wing area, so that $F = 86\sigma V^3_m/\omega$, where ω is the wing loading in lbs. per sq. ft. This value of 3·2 represented an average E/S from machines ranging between 3·0 and 3·5. In drawing the curves σ was taken to be unity and η 75 per cent. for level flight, and 70 per cent. for climbing.

The curves gave b.h.p. per 1,000 lbs. weight for wing loading (ω) of 10 and 15 lbs. per sq. ft., and span loading ($\bar{\omega}$) 2 and 2·5 lbs. per sq. ft. Large commercial aeroplanes such as the "Argosy," W.10 and "Hercules," would, were they ideally streamline, either fly at the present top speed for one-third the present power, or, alternatively, travel some 60 m.p.h. faster for the same power. Two-thirds of the power used by these aeroplanes was being expended on the generation of turbulence which, from the aerodynamic viewpoint, was unnecessary. The improvement in power consumption for climbing was not so great as for top speed, but was still appreciable.

THE AUTOMATIC SLOT.

In view of the fact that successful experiments with the Handley Page Automatic Slot have been carried out on the Westland Wapiti, the address given to members of the Westland Aircraft Society, the Yeovil branch of the Royal Aeronautical Society, on January 17, by Mr. G. C. D. Russell, A.F.R.Ae.S., of Messrs. Handley Page, Ltd., was of particular interest.

Mr. Russell, in the course of a highly technical paper, illustrated with diagrams and lantern slides, said the application of the automatic slot to any given aircraft had in the past necessitated the carrying out of a large amount of experimental work in the wind tunnel, but data would be accumulated in the near future, from which it would be possible to prophesy with fair accuracy, the slot characteristics of almost any type of wing section.

Dealing first with the method of obtaining, and the nature of the data which the wind tunnel was called upon to provide, for any aircraft to which it was proposed to fit automatic slots, Mr. Russell said that the experimental data required actually fell under two headings: "The Slot, its shape and effect," and "Characteristics of the Auxiliary Aerofoil, Resultant Forces, etc.," but a third heading might be added which could appropriately be termed "Improvements," into which could go all the data referring to improvements in the slot control due to factors quite distinct from the actual working of the slot itself. The Handley Page slot as at first used on aircraft, was intended solely to provide wider speed range to the machine so fitted, by enabling the machine to be brought to a much higher angle of incidence before the stall occurred, accompanied by a very high percentage increase in the value of the maximum lift co-efficient which resulted in it being possible to fly the machine with safety at far lower speeds than was possible without the slots.

From the point of view of automatic slots when applied to the wing tips of a machine for the purpose of improving its lateral stability and control the position was rather different. The lateral stability of a machine near or at its stalling point is dependent upon many factors, one of the most important being its ability to resist the autorotative couple which sets in immediately the stalling angle is exceeded, and which is in most cases the primary cause of the incipient spin. The automatic slots when applied to the wing tips definitely delay this autorotative couple to a much higher angle of incidence, thus allowing the righting couple to reassert itself.

With regard to "Improvements," the lecturer remarked that in the past very many experiments had been carried out with the interconnected slot and aileron control, in which a direct connection was made between the ailerons and the slots in front of them, in such a way that the downward moving aileron opens the control slot in front of it, whilst for the upward moving aileron the slot remains closed—this resulting in a large righting couple occurring at angles of incidence, at or past, the stall of the aircraft in question. The reason for this was that one side of the machine was completely stalled while the other side, being slotted was still developing increased lift.

In order to obtain the same effect, and at the same time to allow the slots to function automatically, a lost motion link can be devised, by which either of the slots can be pulled back a little (or completely) when their corresponding ailerons are moved upwards. Alternatively, the pivot points of either front links may be mounted adjustably by eccentric sliding or other means, so that when in the open position the slot may be swivelled by a link connection operated by the aileron. These methods might, however, entail extra loads on the pilot's control column and in order to overcome this some tests were recently made with another device which gave extremely good results and at the same time caused practically no extra loads on the controls. The device is in the form of an interceptor or plate which is situated on the top surface of the wing, and to the rear of the front slot. It is connected to the aileron control, in such a way that for aileron normal it is held flush with the top surface of the wing, but on moving the aileron upwards, it is caused to project above the surface and destroy the effect of the front slot. For front slot closed it can be arranged that the interceptor is entirely out of action. Some full scale tests were recently carried out in order to definitely find out the effect produced on stability and control with various positions of the slots along the wing span. The results clearly indicated that for improvement in stability, the best slot position is undoubtedly at the wing tips of the machine. Similar tests are now proceeding with the slot and interceptor control and the results would appear to be promising.

Concluding, Mr. Russell said it gave him great pleasure to read his paper to that branch of the Royal Aeronautical Society, as he believed it was supported almost entirely by members of the Westland Aircraft Company, to whom his firm owed so much for their full co-operation and considerable effort to make the slot a success. He believed he was right in saying the slot had been a great success on the Wapiti.

Mr. A. Davenport, Chief Designer of the Westland Aircraft Works, who presided, referred to the fact that not only was Mr. Russell an authority on the automatic slot, but he had been connected with a great many research problems in wind tunnel work, and it was, therefore, a good opportunity for them to air their "pet" theories.

Many interesting points were raised during the discussion which followed. "Have you slotted the slot yet?" gained an affirmative answer, the lecturer adding that experiments had been carried out, and there was no reason why they should not do to the slot what they had already done to the wing. In response to a query as to whether there were any means of locking automatic slots, Mr. Russell said that it would be quite an easy matter, but rather dangerous for the simple reason that the slots would be locked when needed. A question was asked as to what would be the effects of the slot on a swept-back wing, and in reply, Mr. Russell said that the Virginia had a swept-back wing, and with slots had given very good results. They had not, however, tried out any wind tunnel tests with the Virginia. Generalising, Mr. Russell said he was interested in the effects of the slots on the Widgeon, as they had not yet done any tests on a monoplane, although they hoped to do so.

Lady Bailey's Flight to CAPE TOWN

21st January, 1929.

Messrs. Shell-Mex, Ltd.,
Shell Corner,
Kingsway.

Dear Sirs,

I am most grateful to you for organising the petrol and oil supplies on my trip from London to the Cape. Both gave me entire satisfaction.

I also used your products whenever procurable on the return journey.

Yours faithfully,

Mary Bailey

SHELL OIL AND PETROL
for Quick-Starting and Reliability

FLIGHT

EDDIES

QUITE, but under such conditions, no doubt, our little air boys would be busy at " footer " or some equally sporty war occupation ! Sure !

THE above—which got lost in the " fog " of press-night—was the little " tail-piece " that should have followed my penultimate paragraph last week, noting a rather vital phase, which apparently had been lost sight of, in connection with the " arm-chair " critic's suggestion for landing armies *via* the Channel Tunnel.

A POINT which has been apt to be rather overlooked is that this tunnel business is not altogether a British pigeon—that France has a very important say in the matter—as Lord Newton very rightly pointed out the other day in the House of Lords. Ridiculing the absurd suggestion amongst others made by responsible people in the past, that a number of soldiers disguised as tourists might make their way over here and seize Dover, Lord Newton added that if any Government entertain a scheme of that kind, it would be much simpler and more effective to send over a lot of aeroplanes some night to lay London in ashes than to rely on a scheme which might be upset by a vigilant ticket-collector. With which most folk will agree.

NOT unnaturally the Prime Minister does not for the moment ventilate any very drastic views of his own upon the just now very much vexed question of the Channel Tunnel. That sooner or later some official guidance will be forthcoming, there is no doubt, and in the meantime Sir Wm. Bull is countering very effectually the various verbal attacks which are being launched against the project. Challenged to mention the half-dozen ways of quickly and successfully blocking the tunnel temporarily in emergency which Sir William said existed, he has now set forth the following as a few of the many ways without destroying it either partially or entirely :—(1) A water dip either end ; (2) poison gas ; (3) cutting off the electricity. Curiously enough the authorities seem also to favour simpler mechanical devices, such as (4) a huge steel door or portcullis, which could fall at once, and (5) two or three shoots down which shingle could automatically fall on to the line. There can be no secret, he says, about these, but, of course, the authorities will have others in reserve.

ALL of which are good and valid reasons *for* the tunnel. What, however, concerns more and will concern this lil ole sea-girt country—forget the Island—is how to trip up unwelcome visitors *via* the air.

THE tragedy reported from Peshawar in which at least three Indian officers and ten men are reported to have been killed, and others wounded, is one of those unfortunate happenings which occasionally in strange territories mar otherwise successful operations which Great Britain has so continuously to enter upon in connection with her widely-spread possessions. The misunderstanding causing the calamity is said to have arisen from permission being given for the R.A.F. to practice bombing, etc., over the same ground as that where combined cavalry, tanks and infantry were already in possession. The R.A.F. contingent was then signalled " Don't bomb," but one machine, it is stated, at a height of some 4,000 or more feet, owing to clouds and bad visibility, misinterpreted the signal as " All clear, carry on." Then a bomb was released, falling 200 yards wide of the target, into the middle of the cavalry squadron, with the above-mentioned results. Investigation will no doubt let light in upon the happening.

As an accident this incident is indeed deplorable, but it should nevertheless suggest a moral in the hope that at least when bombing in reality specific objects, the effects are equally or more disastrous, thereby reducing the possibility of over-prolonged punishing operations.

VERY illuminating are the methods which the enterprising film producer evokes for the thousand and one " realistic " effects which he seeks to " shoot." Aeroplane propellers, as a goodly few visitors to 'dromes can testify, are very suitable for the creation of stormy winds on land, and now this method has been extended to a similar use on the sea. The Calcutta seaplane was reported last week to have thus been brought into action in the Solent in connection with the " Down Channel " film now on the stocks—a small cutter with its two occupants being gradually tossed to pieces and driven to the bottom of the sea. As conjurer Bertram in the days agone used to say, " Isn't it wonderful ? "

WHAT a pity aviation is so little in evidence with the B.B.C. ? Surely no better medium could be imagined than through the ether to spread air-mindedness in the public. But no, however important and vital to this country that the entire community should support aviation and each thereby do his or her little bit towards putting Britain in the forefront in the Air, not only from the Service point of view, but also from the commercial and economic standpoint, the B.B.C. will have none of it. Yet look at the ghastly " turns " in the form of dryasdust talks and tenth-rate alleged amusement items which are forced upon the helpless listener hour by hour, day by day, week by week, *ad infinitum*. Oh, for that switch on our sets by which one—or the lot of listeners—could just tell the " producer " *and* the performers what they really think about them and their show.

YET what a different tale is told when we look abroad. There one of the regular leading items is devoted to matters aviatic. Merely take one station—Warsaw. There they have aviation as a regular topic twice daily—not merely giving crashes and other similar enlivening items as news, but real aviation information, interesting and instructive, with the result that nine out of every ten listeners at that station are acquiring real airmindedness with beneficial results to themselves, their country and the future generation. Again, oh, for that switch !

ALDERMAN KINGSTON'S opinion, expressed at a Brighton Council meeting recently in response to an inquiry by the Air Ministry for views as to the provision of an aerodrome in the district, to the effect that an aerodrome at Brighton would be unpopular, and that " nobody wants to hear the droning of aeroplanes day and night," savours strongly of the since much regretted views of certain Midland towns when stations were suggested in convenient central spots of the leading towns in the early days of Stephenson's " Puffing Billy," following plans to establish railways in England. Certain short-sighted magnates would have none of the beastly, dangerous, and useless contraptions, with the result that in those cases the halting places were selected well away from the centres, to the everlasting inconvenience and lament of the inhabitants, who had for years to travel, in some cases, miles to board trains. A like cry will probably go forth in the days to come, not very far distant, when would-be air patrons, passengers and goods, will deplore the long journey to an outlying aerodrome and wonder why to goodness the authorities that were should have fixed upon an so utterly ungetatable place.

AGAIN aviation has scored by helping members of the Byrd Antarctic expedition to get into wireless telephonic communication for some minutes with New York and the San Francisco broadcasting station over a distance of about 9,000 to 10,000 miles. That this wonderful result was due largely to the fact that Mr. Mathew Hanson, the Byrd wireless expert, was working from an aeroplane — the " Stars and Stripes "—at an altitude of 3,000 ft., there is little doubt, and this record of a two-way telephone conversation between the Bay of Whales in Ross Sea and San Francisco will stand out as a milestone in wireless telephony.

THAT aeroplane which last week was given as an " Alpha-Avian " and so helpfully accompanied Lady Bailey upon her final stage from the French coast to Croydon was, after all, a " Genet-Avian " sent by " Airways " just for the love of the thing and in recognition of the successful termination of Lady Bailey's great effort. Mr. Youell, accompanied by Mr. Spriggs, piloted the Avian over to Berck aerodrome in very bad weather and there found Lady Bailey waiting without anyone in evidence to assist her. Two hours' work by these volunteers put things right, and Lady Bailey was then happy in being able to finish up under the more promising conditions and helpful guidance. Therefore do I honour Airways, " Genet-Avian " and those concerned in this generous and human episode.

AEOLUS

PRIVATE  FLYING

A Section of FLIGHT in the Interests of the Private Owner, Owner-Pilot, and Club Member

FLYING CLUB PROGRESS IN THE ANTIPODES

THE New South Wales section of the Australian Aero Club must surely be the largest flying club in the world. It has a membership of over 700, a permanent staff of 23 employees, twelve aeroplanes, assets exceeding £5,000, and a cash turnover at the rate of £20,000 per annum. Yet the Club is still expanding and facing new demands. The machines used include six Cirrus-Moths, three Gipsy-Moths, two Avro "Avians," and a Westland "Widgeon III" monoplane. The Club started in July, 1926, with 60 members, £300, and a part-time secretary was employed. It had an agreement with the Department of Civil Aviation of the Commonwealth for a period of two years and the assistance granted was the right to use the Mascot Aerodrome, the loan of three D.H. "Moths" with two spare engines; and an allowance for machine spares up to £400 per annum. Further, the Federal Government granted a bonus of £20 for every pilot trained for the "A" licence.

The onus upon the Club was the employment of an instructor and engineer and the maintenance of the aircraft, also replacement of machines from its own funds. One Avro "Avian" was a gift from Mr. J. J. Rouse, of Sydney, whilst the other is on loan from the Department which was presented with it by Sir Charles Wakefield. With club funds four spare A.D.C. "Cirrus Mk. II" engines were purchased. The following are some statistics concerning actual flying operations during the history of the club:—Total number of hours flown by club machines, 6,182; number of flights made, 37,357; passengers carried, not including pupils, 5,651; pupils trained for "A" licence, 90; pupils now receiving instruction, 20; pupils awaiting instruction, 20.

With all this flying not one accident has involved injury to pilot, pupil or passenger. Considerable building extensions have been carried out. The Department built a special hangar and workshop on the aerodrome and there is club provision for permanent boarders. Reading and card rooms, golfing quarters and tennis courts are also available. A nine-hole golf course has been laid out and a full-time professional is permanently employed by the club to instruct members. A country tour in club aircraft was organised with great success, so an extended air tour was arranged at the end of the year to last about five days, in which fifteen machines were expected to take part.

A wireless section has been formed. Wireless apparatus was installed in a machine and on the ground. There is now a ground station and a mobile station operated by the club, and communication was made one night with a New Zealand station.

The club has purchased land adjoining the aerodrome and a modern aircraft factory is being erected upon it, where the club will undertake the complete maintenance and repair of all its aircraft. When completed it will be the only one of its kind amongst clubs in Australia.

Capt. G. F. Hughes, M.C., A.F.C., President of the club, was appointed by the Federal Government as representative in a civil capacity at the International Air Conference in Washington in December.

THE DE HAVILLAND AIRCRAFT OF CANADA, LTD.

Successful First Period of Operation

IT is often said of the British manufacturer that he is too conservative in regard to the Dominion markets, and that as a result he often loses much business to producers from other parts of the world. Whether or not this is true as a whole it is certainly not true of the De Havilland Aircraft Company, which has established its own associated companies in both Canada and Australia, and has made working arrangements with concerns in other parts of the Empire. The year 1928 proved successful for the Canadian associated company of the English parent concern. There was a time when it was feared that the American Aircraft Industry would swamp the Canadian market, and although British manufacturers established in Canada are meeting competition from over the border it is felt that they are holding their own and are in a considerably stronger position than they were a year ago. When the Canadian Government recently placed its orders for new equipment for the 1929 programme practically the whole was allotted either to Canadian manufacturers or to British concerns.

How one British company stepped in to stem the tide of American competition is told in the following report:—

The de Havilland Aircraft of Canada, Ltd., was incorporated in March, 1928, when Mr. R. A. Loader, late assistant business manager of the English de Havilland Company went to Canada to organise the company. Within a few days of the incorporation of the company an aerodrome—which has been described as the best in the vicinity of Toronto and one of the best in Eastern Canada—had been chosen, and by the first week in April a hangar had been erected and additional warehouse accommodation close at hand secured. By the end of April production was in full swing and the first Moth produced (from sets of parts manufactured in England) was the one presented to the Toronto Flying Club by Sir Charles Wakefield. Then followed several machines for private owners and one for Dominion Airways of Vancouver.

As early as the middle of May production reached four weekly to cope with an order for twenty Moths placed by the Controller of Civil Aviation for the equipment of the Canadian Flying Clubs, and continued at that rate until the slackening of the flying season in October. Moths were supplied in quantity to the Royal Canadian Air Force, International Airways, Aircraft Ltd., Great Western Airways, Ltd., and other concerns operating flying schools. A number was delivered to mining companies operating in Northern Ontario and Quebec where aeroplanes are the only practical means of transport. So successful did those machines prove that it seems likely that in 1929 the Moth will be the standard vehicle of the up-to-date prospector. Private owners increased rapidly during 1928, and there is every indication that a further steady increase will occur in 1929.

The company has established a very efficient service station where a large stock of spare parts is kept. A repair and overhaul branch is also in operation. The extension of those services to other important centres in the Dominion at an early date is contemplated. During 1928, from April 17 to December 31, the company's machines on test, demonstration and instructional work, flew over 450 hours, equivalent to 35,000 miles, without a single breakage or injury to personnel.

A special school was established in June at the request of the Department of National Defence to undertake the training of Flying Club instructors. That school, which was in the charge of Mr. E. Leigh Capreol, a Canadian and the chief pilot of the company, was a great success and no less than eight pilots trained obtained their commercial licences and are now doing well with the organisations which they joined. Mr. Capreol has also taught a number of other pilots *ab initio*, several of whom now own their own Moths.

During the course of demonstrations, the company's machines have covered a large portion of the provinces of

Ontario and Quebec, either as landplanes or seaplanes, and a programme of flights of that nature is constantly being carried out.

Gipsy-Moth Popular

In October the first Gipsy-Moth arrived in Canada and the company soon found it difficult, owing to the enormous popularity of the new model throughout the world, to cope with the demand which ensued.

In November the first of the metal-fuselage Moths—a type specially designed for Canadian conditions as a result of observations and experiments carried out on the spot—arrived from England. It was immediately demonstrated before the officials of the Dominion and Provincial Governments, with the pleasing result that it has been adopted as standard by the Royal Canadian Air Force Training Branch, Civil Government Air Operations Branch, Civil Aviation Branch, and by the Ontario Provincial Government and many other important users of aircraft. In November the company's factory at the present leased aerodrome was doubled in size to cater for the 1929 spring production, and a new aerodrome was purchased where a permanent factory will be erected in the spring.

As time passed more and more work on the production of machines has been done in Canada, and it is expected that as soon as the new factory is available the Moth will be entirely produced in Canada. During 1928 the company delivered no less than 62 Moths, which are now spread from St. John, N.B., in the east to Victoria, B.C., in the west, with fairly even distribution across the country. At the outset of 1929 the company finds itself in the enviable position of having orders in hand for a number of Moths exceeding the whole production for 1928. These include 34 Moths, landplanes and seaplanes, for the re-equipment of the Royal Canadian Air Force Training establishments; five for the Civil Operations Branch, which already uses a large fleet for forest fire protection; nine for the Controller of Civil Aviation for further equipment of flying clubs; a quantity for the Ontario Provincial Government Air Service, which operates a large fleet for patrolling the forests of the province; and many for private owners, who will take delivery at the opening of the flying season in the spring.

Handley Page Slots Standardised

It is interesting to note that the Royal Canadian Air Force and the Ontario Government Air Service, as well as practically every private owner, has standardised on the Handley Page automatic safety slot gear. So successful has the Gipsy-Moth been that the Ontario Government has decided to re-equip all its existing Moth fleet with the 85-100 h.p. Gipsy engine. This decision was taken as a result of a test made at the de Havilland aerodrome at Toronto, when a Gipsy-Moth was flown and maintained by the personnel of the Service for 152 hours on the particularly hard work of a flying school. The test covered approximately five weeks of intensive flying, and on completion the engine was stripped down and found to be in perfect condition.

Experiments conducted by the company have resulted in the production of a very efficient and low-priced ski undercarriage, which is a necessity for winter operations in Canada. The personnel of the company is now engaged on the problem of providing warmth and comfort for pilot and passenger during extremely cold weather, and a practical device has been evolved.

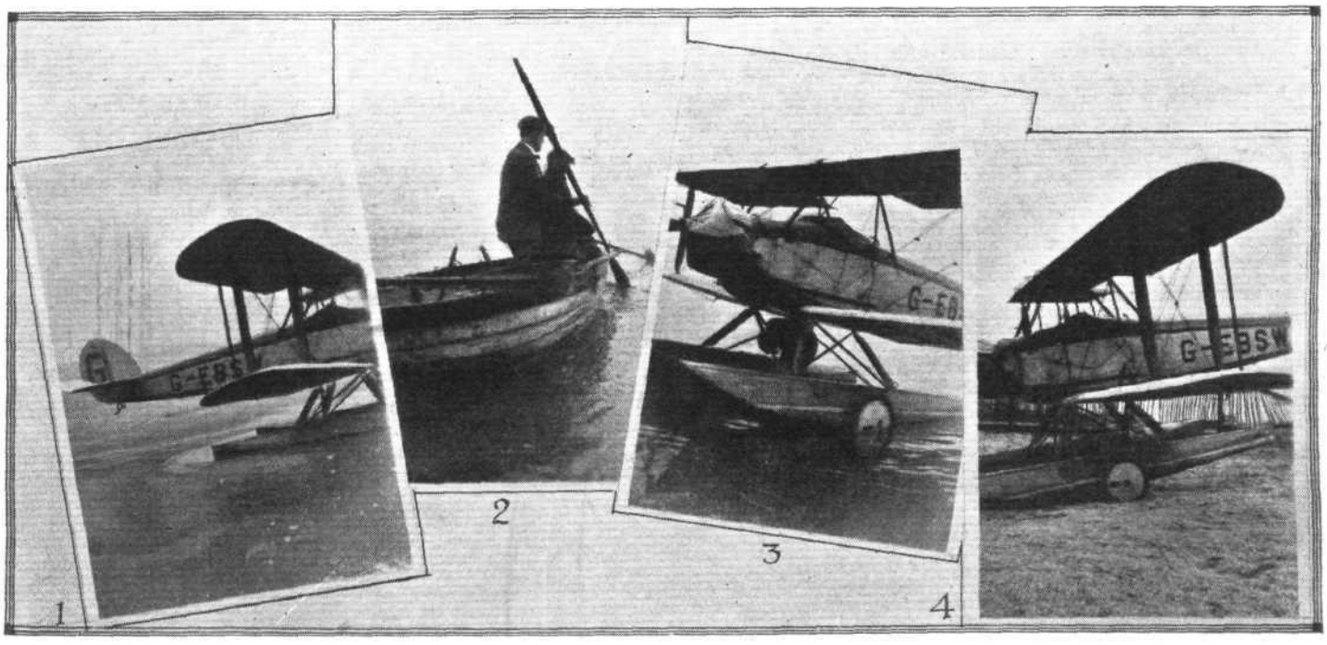
The personnel of the de Havilland Aircraft of Canada, Ltd., has expanded since its inception from three to nearly thirty, and although the nucleus came from the English factory, the majority are Canadians who have been trained in the company's work.

CLUB FLYING IN NEW ZEALAND

THE first flying club in New Zealand was started at Auckland, early last year, and it is styled the Auckland Aero Club. Three D.H. "Moths" and one other machine (from private sources) are being used, and the membership is 373 and 61 pupils. A most informative booklet has been published by the Club, which also sets forth a brief history of aviation in New Zealand. Little had been done in the country, in spite of valiant efforts of one or two pioneers such as the Walsh Brothers, who built machines, taught themselves to fly, and subsequently ran a New Zealand Flying School.

At the end of the war there were two civilian aviation schools, the Canterbury N.Z. Aviation Co., at Sockburn, using Caudron biplanes, and the N.Z. Flying School at Kohimarama, run by the Walsh Brothers, using Boeing seaplanes and Curtiss flying-boats. The two schools had, with the endorsement of the Defence Department and the financial support of a few patriotic citizens, undertaken the preliminary training of pilots during the war. One example of the good work accomplished was the 170 qualified pilots which had passed through the Canterbury School at the time of the Armistice.

Early in 1928 the Government decided to subsidise two or three approved aero clubs, with a view to encouraging air-mindedness in New Zealand. Auckland Aero Club was formed on April 24, and had a membership of over 300 by the following September, with a long waiting list of pupils. Entrance fees and subscription fees are one guinea and three guineas respectively for pilot members, and ten guineas and three guineas respectively for pupil members. If a pupil obtains the "A" licence without damaging the Club's



These are views of the rescue of Col. the Master of Sempill's Blackburn "Bluebird" light seaplane from the grip of the ice, ¾ in. thick, which covered the Welsh Harp at Hendon in December last. Wheels were attached after the beaching, and the machine was run up the Edgware Road to Hendon. Col. the Master of Sempill is a devotee of the light seaplane, and he always extols its use, particularly for Great Britain.

aircraft or equipment, and the Club receives from the Government a bonus for training the pupil, then nine guineas of the entrance fee may be refunded, less any charges or fines due to the Club.

Instruction costs £3 10s. per hour, and passenger flights the same. Except under special circumstances, passenger flights are not allowed except at week-ends. A £1 flight permits of a good view of Auckland and the harbour, from 2,000 ft. if the weather is good. Longer and shorter flights for corresponding fees can be given. Major G. A. Cadogan Cowper is the instructor, and Major K. Caldwell, M.C., D.F.C., is Club Captain. A member of the committee is Mr. D. Mill, who is the New Zealand agent for D.H "Moths." He came to England for several months some time ago, and took a D H "Moth" back with him The President is Mr. Robert Burns. The aerodrome is situated 10 miles from Auckland by road, and a motor service is maintained, which will be improved as demand arises.

LIGHT 'PLANE CLUBS

London Aeroplane Club, Stag Lane, Edgware. Sec., H. E. Perrin, 3, Clifford Street, London, W.1.

Bristol and Wessex Aeroplane Club, Filton, Gloucester. Secretary, Major G. S. Cooper, Filton Aerodrome, Patchway.

Cinque Ports Flying Club, Lympne, Hythe. Hon. Secretary, R. Dallas Brett, 114, High Street, Hythe, Kent.

Hampshire Aero Club, Hamble, Southampton. Secretary, H. J. Harrington, Hamble, Southampton.

Lancashire Aero Club, Woodford, Lancs. Secretary, F.W. Atherton, Woodford Aerodrome, Cheshire.

Liverpool and District Aero Club, Hooton, Cheshire. Hon. Secretary, Capt. Ellis, Hooton Aerodrome.

Midland Aero Club, Castle Bromwich, Birmingham. Secretary, Major Gilbert Dennison, 22, Villa Road, Handsworth, Birmingham.

Newcastle-on-Tyne Aero Club, Cramlington, Northumberland. Secretary, J. T. Dodds, Cramlington Aerodrome, Northumberland.

Norfolk and Norwich Aero Club, Mousehold, Norwich. Secretary, G. McEwen, The Aerodrome, Mousehold, Norwich.

Nottingham Aero Club, Hucknall, Nottingham. Hon. Secretary, Cecil R. Sands, A.C.A., Imperial Buildings, Victoria St., Nottingham.

The Scottish Flying Club, 101, St. Vincent Street, Glasgow. Secretary, Harry W. Smith.

Southern Aero Club, Shoreham, Sussex. Secretary, C. A. Boucher, Shoreham Aerodrome, Sussex.

Suffolk Aeroplane Club, Ipswich. Secretary, Maj. P. L. Holmes, The Aerodrome, Hadleigh, Suffolk.

Yorkshire Aeroplane Club, Sherburn-in-Elmet, Yorks. Secretary, Lieut.-Col. Walker, The Aerodrome, Sherburn-in-Elmet.

LONDON AEROPLANE CLUB

REPORT for week ending January 27.—Pilot instructors: Capt. V. H. Baker, M.C., A.F.C., Capt. F. R. Matthews. Ground engineers: C. Humphreys and A. E. Mitchell. The following machines were in commission during the week: G-EBMP, G-EBXS, G-AABL, G-EBZC. Flying time: The total flying time was 20 hrs. 25 mins. Dual instruction: Seventeen members received dual instruction during the week, the time being 10 hrs. 5 mins. Solo flying: Eleven members flew solo during the week, the time being 10 hrs. 20 mins. Mr. J. Scott-Taggart passed the qualifying tests for his Aviator's Certificate on January 19.

Club House Fund: The following donations have been received during the week:—Mr. and Mrs. J. W. P. Chalmers, £3 3s.; Mr. J. Mackillop Brown, £2 2s.; Mr. T. Elder Hearn, £2 2s.; Mr. M. H. Volk, £1 1s.; Miss M. S. D. Wilson, £1 1s.

Members wishing to assist are requested to forward their donations to 3, Clifford Street, London, W.1.

Dinner, Dance and Cabaret.—The Club will hold a Dinner, Dance and Cabaret at the New Princes Galleries, Piccadilly, W.1., on Tuesday, February 26, 1929, at 7.30 for 8 o'clock, till 2 a.m. Tickets: Single, 17s. 6d.; double, 30s. All applications for tickets to be made to the London Aeroplane Club, Stag Lane Aerodrome, Edgware.

It is hoped that all members will make a special effort to support this Dinner, Dance and Cabaret, and bring their friends.

BRISTOL & WESSEX AEROPLANE CLUB, LTD.

REPORT for the week ending January 26.—Pilot instructor for the week: Mr. E. B. W. Bartlett. Machines in commission (2)—G-EBTV, G-EBYH. Flying time for the week, 11 hrs. 45 mins.; pupils under instruction (5), 4 hrs. 55 mins.; soloists under instruction (1), 5 mins.; "A" pilots flying (6), 6 hrs.; passengers carried (2), 15 mins.; test flights (6), 30 mins.

Flights to Birmingham by Mr. Downes-Shaw and to Cardiff by Mr. Holmes and Mr. Ashley Hall were the longest individual trips during this last somewhat uninviting week. Mr. Heaven successfully negotiated his first solo. We are running a dance at the Grand Hotel, Broad Street, Bristol, on February 15, commencing at 8.30 p.m, and hope to see about 150 couples. The price of tickets is 3s. each.

HAMPSHIRE AEROPLANE CLUB

REPORT for week ending January 26.—Pilot instructors: Flight-Lieut. F. A. Swoffer and Mr. W. H. Dudley. Ground engineers: Mr. E. Lenny and Mr. J. Elliott. Aircraft: D.H. 60 Moths G-EBOI and G-EBOH. Flying time for the week, 28 hrs. 45 mins. Pupils under instruction (15), 16 hrs. 10 mins.; soloists (3), 5 hrs. 35 mins.; "A" pilots, solo (7), 5 hrs.; passengers with "A" pilots (5), 1 hr. 15 mins.; tests (10), 45 mins.

Our flying time is improving gradually with the better weather. However, owing to a rather appalling landing by Col. Betts on Thursday, OI will be out of commission for some time with a badly damaged fuselage.

On Tuesday, Capt. Kirby and Mr. Dudley Watt flew OH and OI to the Isle of Wight. Owing to a sudden fog descending they were unable to return to Hamble, and the machines had to stay for the night in Messrs. Saunders' hangar. Mr. Powis kindly lent us OT on Wednesday for the Instructors to fly to the Island and return with our own machines.

The Annual Dinner has been arranged for February 8 at the South Western Hotel, Southampton, and we hope to see a large gathering of members and friends

HOUSEHOLD BRIGADE FLYING CLUB

REPORT for period December 10, 1928, and January 10, 1929.—Total flying time, 10 hrs. 45 mins.

Lympne.—Dual: Mr. E. V. Somerset, 1 hr. 15 mins.; Mr. R. J. R. West, 15 mins.; Mr. A. V. C. Douglas, 15 mins. Solo: Mr. E. V. Somerset, 5 hrs. Mr. A. V. C.-Douglas, 2 hrs. 30 mins.

Brooklands: Mr. W. T. d'Eyncourt, 1 hr.; Capt. Ellison, 30 mins.

Lieut. E. V. Somerset, Coldstream Guards, has obtained his "A" licence.

Lieut. A. V. Douglas, Scots Guards, has purchased a D.H. 53.

Total flying time from October 1, 1928, 54 hrs. 55 mins. Number of licensed pilots, 8. Number of members with private machines, 4.

LANCASHIRE AERO CLUB

REPORT for week ending January 26.—Flying time, 14 hrs. 40 mins. Instruction (12), 3 hrs. 45 mins.; solo flights (13), 9 hrs. 25 mins.; passenger flights (1), 10 mins.; tests (8), 1 hr. 20 mins.

Instruction.—With Mr. Hall: Messrs. Cohen, Garner, Ashworth, W. Sellers, Davies, R. G. Gattrill.

With Mr. Cantrill: Messrs. Gort, Whitehouse, R. G. Davies, Ashworth, W. Stern, Sellers.

Machines in commission: XD, MQ, QL, PH. Soloists (under instruction): Mr. Garner. Pilots: Messrs. Goodfellow, Cohen, R. F. Hall, Meads, Mills, Weale, Michelson, Williams, Lacayo, Gattrill, Ruddy, Gort.

Passenger: With Mr. R. F. Hall: Mr. R. G. Davies.

LIVERPOOL & DISTRICT AERO CLUB

REPORT for week ending January 19.—Machines in commission: XX and WK Avro "Avians. Instructors: Flight-Lieuts. J. B. Allen and E. A. Sullock (Hon.). Ground engineer: Mr. H. Pixton. Total flying time: 19 hrs. 35 mins. Dual under instruction (16), 10 hrs. 25 mins.; solo under instruction (8), 4 hrs. 10 mins.; "A" pilots (6), 3 hrs. 25 mins.; passenger flights (3), 50 mins.; test flights (8), 45 mins.

Mr. C. Francis completed his practical tests for pilot's certificate on Wednesday afternoon, and Mr. E. H. Williamson performed a successful height test on Friday.

Capt. C. D. H. Crawshaw, a new member, with previous flying experience, took an Avian solo after a few minutes' dual with Flight-Lieut. Allen, and was most enthusiastic on his return to earth.

This week's smile:—A local paper rang us up at 8 p.m. a few evenings ago to ask if we would fly one of their staff to Ireland at once.

Report for week ending January 25.—Machines in commission: Avro Avians XX and WK. Instructor: Flight-Lieut. J. B. Allen. Ground engineer: Mr. Howard Pixton. Total time flown, 30 hrs. 40 mins. Dual (9), 8 hrs. 40 mins.; solo (6), 5 hrs. 10 mins.; solo, "A" pilots (8), 5 hrs. 55 mins.; passenger flights (3), 20 mins.; test flights (7), 35 mins.

Owing to bad visibility, flying was only possible on four days.

Mr. Greenhalgh made another attempt at his height test on Sunday last, and landed perfectly within 50 yards of the mark thus showing the remarkable improvement of approximately 9 miles 3 furlongs on his previous effort.

Messrs. W. A. Wilcox and E. H. Williamson also completed their practical tests for aviator's certificate this week.

On Sunday last Mr. Moulsdale completed 20 hours' solo flying, and celebrated by taking a lady passenger for a joy-ride. "Mo's" well-known shy and retiring disposition apparently led him to pay more attention to the novelty of his situation than the landmarks; with the result that he completely lost himself, returning at last just before dark, it is whispered, mainly owing to the superior knowledge of topography displayed by his fair companion!

We have on order an Avian Mk. IV machine and hope to take delivery this week.

MIDLAND AERO CLUB

REPORT for week ending January 26.—Total flying time, 18 hrs. 1 min. Dual, 2 hrs. 45 mins.; solo, 9 hrs. 30 mins.; passengers, 20 mins.; test, 1 hr. 1 min; cross-country flights, 4 hrs. 25 mins.

The following members were given dual instruction by Flight-Lieut. T. Rose, D.F.C., and Mr. W. H. Sutcliffe: T. W. Wild, L. V. Mann, A. B. Gibbons, Mrs. Leigh Fermor, Capt. J. C. Chaytor.

"A" Pilots:—E. P. Lane, E. D. Wynn, S. H. Smith, J. Rowley, H. J. Willis, W. M. Morris, G. C. Jones, R. D. Bednell, W. Swann, R. L. Jackson, A. B. Gibbons.

Soloists:—W. L. Handley, J. K. Morton, L. V. Mann, M. Blakeway, Capt. J. C. Chaytor. Passengers:—E. Hanson.

On Saturday, Capt. J. C. Chaytor passed the flying tests for his "A" licence.

During the week the Club took delivery of D.H. Moth G-A ADB (Cirrus Mk. II), which was flown from Stag Lane by Flight-Lieut. Rose.

Four Moths are now in commission.

NEWCASTLE-UPON-TYNE AERO CLUB

REPORT for week ending January 27.—Instructor: G. M. S. Kemp. Ground engineer: K. C. Brown; assistant, J. Tait. Aircraft (3): PT, QV, LX. Total flying time, 6 hrs. 10 mins. Instruction (2), 1 hr. 10 mins.; "A" pilots (3), 5 hrs.

Weather conditions have again considerably reduced our flying time, and we are anxiously awaiting a fine Sunday to enable us to proceed with the landing competition, which is already two weeks in arrear owing to unfavourable weather.

Mr. F. L. Turnbull (recently appointed hon. assistant aerodrome manager) and the instructor called at De Havilland's last Friday and took over G-EBQV. This machine has been up for repairs, necessitated through the hangar roof falling on the machine during the gale last November. However, after a good journey last Saturday the machine is now safely housed on the aerodrome, and once again our fleet of three machines are on service.

Our private owners are making use of the few fine days to put on the hours, and the slotted Gipsy-Moths are the envy of all. The second Club dance of the season will be held in Newcastle on February 6, and we are looking forward to an enjoyable evening and a good turn-out of members and friends.

NORFOLK & NORWICH AERO CLUB

REPORT for week ending January 27.—Instructor: Capt. J. C. Houston, M.C. Ground engineer: A. Kirkby. Machines in commission (2): QX and ZW. Flying time for week, 6 hrs. 35 mins. Pupils under instruction

(6), 4 hrs. 50 mins.; soloists under instruction (2), 25 mins.; "A" pilots (3), 1 hr.; passengers (3), 15 mins.; tests (1), 5 mins.

We are pleased to welcome our latest pupil, who received his first lesson this week; this is Mr. J. T. E. Woolsey. It is unfortunate the weather has not been more favourable, as only three days have been really fit for flying here.

Saturday next we are holding the second of our club dinners, after the great success of one we had some two weeks ago. Mr. J. D. North has promised to give a short lecture afterwards, which will be followed by a highly interesting auction (not aircraft—sorry).

Five new members have joined the Club this week, bringing our total up to 366.

On Friday, February 22, we are holding the Club's annual dinner at the Maid's Head Hotel, further details of which will be forthcoming very shortly.

SCOTTISH FLYING CLUB, LTD.

REPORT for week ended January 26.—Chief instructor: Mr. R. M. Stirling, A.F.C. Ground engineer: Mr. W. Calder. Machine in commission during week: X Moth G-EBYG. Dual instruction: 50 mins.; solo flying, 5 hrs. 25 mins.; passenger flights, 2 hrs. 50 mins.; tests, etc., 1 hr. 5 mins. Total, 10 hrs. 10 mins.

Instruction (with Mr. Stirling): Messrs. H. D. Primrose and A. C. Jack.

Weather conditions, particularly fog, continue to handicap instructional work very seriously, and have reduced our flying time to a most depressing level. On Friday, however, Mr. J. Wood Harrington made a successful trip to Turnhouse Aerodrome, Edinburgh, in G-EBYG, despite trouble with fog on the return journey.

Our Avro Avian, G-EBTY, has now been acquired by Mr. D. K. Fairweather, and was withdrawn from club work at the end of last week. G-EBVT, however, is practically ready for service, and will probably be in use within the next few days. It is hoped also to replace G-EBTY with another X Moth at an early date.

Arrangements are now well in hand in connection with the third Club dance of the season, to be held in the Waldorf, Glasgow, on Friday, February 8, and those intending to be present are requested to procure tickets as early as possible. These may be had from the aerodrome offices or from Mr. H. W. Smith, 101, St. Vincent Street, Glasgow, price 5s.

SOUTHERN AERO CLUB

REPORT for week ending January 27. Our flying times this week have kept up to quite a good average, and the fine week-end again brought out a number of enthusiasts, despite the cold. On Wednesday, Mr. Barnet did his first solo.

Mr. Thynne, who is under instruction, flew over on Sunday with Mr. Miles, on Avro G-EBYB, to his home at Findon, a few miles away, where a landing was made in a convenient field.

The Club has vacancies for a number of additional members, and those wishing to fly Avros can do so without any waiting, either during week-days or at week-ends.

SUFFOLK & EASTERN COUNTIES AEROPLANE CLUB

REPORT for week ending January 26.—Flying time, 15 hrs. 30 mins. Instruction, 10 (6 hrs 55 mins.). Solo, under instruction, 1 (20 mins.). "A and B" pilots, 6 (7 hrs. 45 mins.). Passengers, 1 (5 mins.). Tests, 5 (25 mins.).

Aerodromes: Hadleigh, Suffolk, and Conington, Cambs. Seaplane Base, Brightlingsea, Essex.

Instructor: G. E. Lowdell, A.F.M. Ground engineers: "C," E. Mayhew; "A," G. Keeley. Aircraft: 3 Blackburn "Bluebirds," RE, SZ and UH. Total flying time for week, 20 hrs. 15 mins.

We received a serious blow during the week. Mr. Glen Ogilvie was making excellent progress with his tests for "B" licence, and everything in the garden appeared to be roses, despite fog, which greatly impeded his attempts to carry out the 200 miles' cross country, when suddenly the Air Ministry announced that all arrangements to continue the tests must be deferred for another 18 months, as he is only 17½, and not the requisite age of 19. This is a great disappointment to Mr. Ogilvie, who has just left Rugby for the sterner fields, as represented by the metal shops in the works of one of our leading exponents of metal aircraft.

Arrangements are proceeding apace with the dinner dance, to be held in honour of our Lady President's great flight round Africa. We feel it is a great privilege that Lady Bailey has consented to devote some of her time to us in this manner so soon after her return home, as we realise that she must have a great number of other calls upon her at this juncture. It is hoped that members and others will rally round to do the honours which the occasion warrants. We regret that Sir Courtenay T. Warner, Bart., the Lord Lieutenant of the County of Suffolk, under whose patronage the function is being held, and Lady Leucha Warner, are unfortunately detained in London on the date selected, viz., February 7. Apparently, the organising committee is very busy. Whispered conferences take place in the aerodrome, and the committee are seen to head for Ipswich in ones and twos, bent upon making the event a success.

The Cambridge Aero Club.—Flying time, 4 hrs. 45 mins. Instruction, 4 (3 hrs. 45 mins.). "A" Pilots, 1 (30 mins.). Passengers, 5 (25 mins.). Tests, 1 (5 mins.).

Three new members started instruction during the week. This club is now in full swing, and the membership is increasing rapidly. For the time being, flying takes place on Mondays and Thursdays, weather permitting. It is hoped shortly to station an instructor and machine permanently at Conington.

YORKSHIRE AEROPLANE CLUB

REPORT for week ending January 26.—Pilot instructor, H. V. Worrall. Ground engineer, R. Morris. Machines in commission, 3 (TB, SV, and RF). Flying time, 8 hrs. 55 mins. Instruction, 8 (4 hrs. 20 mins.). Soloists, 2 (1 hr. 25 mins.). "A" pilots, 6 (2 hrs. 35 mins.). Test flights, 7 (35 mins.).

Flying activities have been restricted owing to the thick fog which has been prevalent during the past week.

FROM THE FLYING SCHOOLS

Brooklands School of Flying, Brooklands Aerodrome

REPORT for week ending January 27.—Instructor, Capt. A. E. Jones. Ground engineers, W. A. Watts, W. H. Hellon. Machines in commission, Renault Avros G-EBVE and G-EBWJ. Flying time, 11 hrs. Soloists, 2 hrs. 25 mins. Joy rides, 15 mins. Dual instruction, 8 hrs. 20 mins.

Mr. W. L. Mummery flew his first solo during the week, and Mr. G. P. Kerr completed his tests for his "A" licence.

We are glad to welcome our managing director, Mr. H. D. Davis, after his absence of two months' illness.

Henderson Flying School, Croydon Aerodrome

REPORT for week ending January 27.—The training of three officers for the Auxiliary Air Force continued over the week-end, 5 hrs. flying being put in. It is just 13 years since Col. Henderson commenced teaching at Croydon, and it is interesting to note that he was responsible for the installation of the first Monosoupape Gnome engine in an Avro 504 in the then Training Brigade. This type is still considered by him to be the finest training machine in the world—and the opinion of his pupils when they fly on the relatively easy types of modern light aeroplane occasionally, fully bear out his view!

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Flying Club Movement in India

THE new Delhi Flying Club was opened by the Viceroy, Lord Irwin, at the Royal Air Force aerodrome, on January 28. Lady Irwin christened the two "Gipsy-Moths" *Delhi* and *Roshanara*. The Viceroy said that to many the ceremony might become historic. The light aeroplane club movement was fast growing in all parts of the world, and India owed much in that direction to the assistance and enthusiasm of Sir Victor Sassoon. A flying display by D.H. "Moths" and R.A.F. machines followed the ceremony, and a number of women were taken for flights. The Government presented the Club with the two machines and will contribute £1,500 annually for two years towards the expenses of the club. The president is Sir John Thompson, Chief Commissioner of Delhi.

A "Napier-Widgeon"

MR. C. S. NAPIER, the son of Mr. M. S. Napier, co-managing director of D. Napier and Sons, Ltd., who is a premium pupil now passing through the engine shops of the Westland Aircraft Co. Ltd., has ordered a Westland "Widgeon." It will be fitted with the D.H. "Gipsy" engine. Mr. C. S. Napier has already learned to fly.

Split Axle Tests on "Widgeon" and "Wapiti."

A NEW split axle undercarriage has been successfully tested on the Westland "Widgeon." The machine is steadier on the ground with the wider track, which gives greater clearance, and withstands heavy landing shocks. Similar experiments have been made with the Westland "Wapiti" with the same satisfactory results. Wing-Commander W. H. Anderson, R.A.A.F. (Australian Liaison), flew a "Wapiti" with the split axle recently and was very pleased with the effect. Incidentally he gave a display of aerobatics.

University Air Squadrons

SIR PHILIP SASSOON, M.P., Under-Secretary for Air, presiding at a lecture given by Wing-Commander A. G. R. Garrod (principal instructor to the Oxford University Air Squadron) at the Royal United Service Institution, Whitehall, on January 16, said that he was enormously struck last year, which was the first time the auxiliary air squadrons took part in the exercises over London, by the keenness they showed and the efficiency and excellent results achieved. He had followed the work of the university air squadrons very closely and had been impressed by their efficiency. He thought the squadrons would play an extremely important part, if not a vital one, in the air defence of this country.

Wing-Commander Garrod said the reasons for the Air Ministry, in 1925, inaugurating air squadrons at Oxford and Cambridge Universities were twofold. The first was to enlist the aid of university men in the problems of flying, and the second to encourage a flow of candidates for officers in the regular Air Force. Although Cambridge had, so far, provided more regular Air Force officers, he believed that very shortly both universities would be sending an average of 15 a year. The pay and prospects in the Royal Air Force compared favourably with those of the Home Civil Service.

Aerodromes for Aix-la-Chapelle

AERODROMES and landing fields are to be laid out near Aix-la-Chapelle as soon as circumstances dependent on the Allied occupation permit.

China Orders Avro "Avians"

AN order for 14 Avro "Avian" light aeroplanes fitted with A.D.C. "Cirrus" engines has just been received from China. The first machine will be fitted with the Handley-Page slots and flown to China for delivery.

Lady Heath

MESSAGES from America state that Lady Heath took the oath for American citizenship on January 29, as she intends to make her home there. In five years she may apply for final papers.

Aerial Experiments on Air Liner

A NEW experimental aerial system for the transmission and reception of wireless telephone messages while in flight has been installed in an air liner on the Imperial Airways London-Paris service. Instead of trailing below the machine the aerial is fixed to the wings and can be used even when the machine is on the ground.

AIRISMS FROM THE FOUR WINDS.

New Australian Airways Company

THE Eyre Peninsula Airways, Ltd., of Adelaide, South Australia, has been formed to operate air lines between Adelaide, Elliston, Port Lincoln, Streaky Bay and other parts of the Eyre Peninsula, and other places in the Commonwealth of Australia. The managing director and senior pilot is Lieut. Albert Geo. Packer and the secretary is Mr. J. H. McKinley Moate. It is intended first to carry passengers between Adelaide and the Eyre Peninsula. Flying is expected to begin early this year.

Australian Aerial Services, Ltd.

SINCE the inception of the Australian Aerial Services, Ltd., of Melbourne, the company's machines have flown 689,853 miles, and without a fatal accident. Recently, the Governor-General was flown from Mildura to Melbourne by Pilot F. Neale, in 4½ hours.

Perth-Derby Air Route

THE *Airways Bulletin* from Perth, W.A., reports a successful year on the Perth-Derby air service. There has been a marked increase in the number of passengers and mails and weight of freight carried, while over one million miles have been covered by the service aircraft, exclusive of the Perth Flying School mileage. The passengers carried between 1921 and 1928 total 10,795. About 50,000 miles have been flown on special trips. A Perth-Adelaide service commences in April this year.

Ceylon Co-operates with Imperial Airways

THE Ceylon Government is negotiating with Imperial Airways for a Bombay-Colombo air service to link up with the service from London to Karachi.

Canadian Air Mail Line Opened

ON January 28, an air mail service between Ottawa, Montreal, St. John, and Halifax was opened by Sqdn.-Ldr. Lawrence and Flying Officer A. B. McLean, the former flying the stage in 4 hrs. 15 mins in a Fairchild cabin monoplane fitted with skids.

Swedish Air Lines

THIS summer a number of improvements in the air service between the Swedish capital and the Continent will be made. It will be arranged that travellers by air will be able to leave Stockholm in the morning and land at Milano, Vienna, Paris or London the same evening. There will be two daily services to Finland-Stockholm-Helsingfors and Stockholm-Aabo, and direct daily connections from Stockholm to Stettin, Travemünde and Danzig will probably be established. The airport authorities and the Aerotransport Company, of Sweden, are directing their efforts towards an increase in the speed and comfort of the aircraft employed in Continental traffic.

Holland-Dutch E. Indies Service

IN April a regular air service between Holland and the Dutch East Indies will begin.

Fokker Machines for France

THE Compagnie Internationale de Navigation Aerienne has ordered ten Fokker commercial machines from the Fokker Works at Amsterdam. They include seven F. VII types fitted with Bristol "Jupiter" engines and three F. VII-3 m. types, fitted with Bristol "Titan" engines.

And for Belgium

THE S.A.B.C.A. Company (Société Anonyme Belge de Constructions Aeronautiques) has acquired the licence to build Fokker aircraft in Belgium in their works at Evere (Brussels). The Fokker F.VIII-3m. will be fitted with Bristol "Titan" engines and used on the Belgian airlines, in the Belgian Congo, and also on the route between Belgium and its Colonies. Fokker machines are now used by more than 30 different airline companies throughout the world.

London-Brussels Night Air Mail

IN May, a night air-mail service between London and Brussels may start, organised by the Belgian Minister of Aviation. Machines will leave Brussels at 11 p.m., and reach London at 1.30 a.m., in time for the first London mail delivery. A saving of 24 hours may thus be saved.

Island Discovered by Com. R. Byrd

DURING a flight over King Edward VII Land in the Antarctic recently, Com. R. Byrd, the American explorer, discovered a new island and fourteen peaks, according to his wireless message, published in the *New York Times* on January 28.

Aircraft Search for Steamer

AFTER a vain aircraft search the Latvian authorities have concluded that the Latvian steamer Laima, which disappeared last week near Liepaja, has been lost with its crew of eighteen.

Germany Tests British Variable-Pitch Airscrew: A series of successful tests were recently carried out in Germany with the Gloster-Hele-Shaw-Beacham Variable-pitch airscrew, fitted to a Junkers J.34 monoplane (Bristol "Jupiter VII"), as shown in the accompanying photo.

FLIGHT

THE ROYAL AIR FORCE

London Gazette, January 25, 1929

General Duties Branch

E. L. Mole is granted a permanent commn. as a Pilot Officer (Jan. 14), 1928; Lieut. E. B. Carnduff, R.N., is reattached to R.A.F. as Flying Officer with seniority of Jan. 14 (Jan. 10), with seniority of June 16, 1924. The follg. Flying Officers are transferred to the Stores Branch on probation (Jan. 10):—R. B. Fleming, C. H. W. Boldero, A. E. Haes, J. T. Riggs.

Squadron Leader H. F. A. Gordon, O.B.E., is placed on retired list at his own request (Jan. 19); Flying Officer A. R. Hamilton (Lieut., Highland Light Inf.) relinquishes his temp. commn. on return to Army duty (Jan. 17).

Accountant Branch

The follg. Pilot Officers on probation are confirmed in rank and promoted to rank of Flying Officer (Dec. 3, 1928):—R. D. Pratt, R. L. M. Hall.

Medical Branch

Squadron Leader J. C. Osburne, M.B., is placed on retired list on account of ill-health (Jan. 7); Flight-Lieut. E. G. Howell is transferred to Reserve, Class Dii (Jan. 23).

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

The Hon. F. A. I. Eveleigh-de Moleyns is granted a commn. in Special Reserve as Pilot Officer on probation (Oct. 24, 1928); W. H. Bigg is granted a commn. in Class BB as Pilot Officer on probation (Jan. 22). The follg. Pilot Officers are promoted to rank of Flying Officer:—B. F. Cox (Jan. 18); G. H. Robins (Jan. 19).

The follg. Flying Officers are transferred from Class A to Class C:—H. N. V. Le Vavasseur Noel, D.F.C. (Dec. 4, 1928); D. M. N. Coles (Jan. 3); L. H. Ross (Oct. 10, 1928). Pilot Officer H. Spooner is transferred from Class AA to Class C (Aug. 19, 1928); Flying Officer D. M. Tomlinson is transferred from Class B to Class C (Dec. 16, 1928); Flying Officer D. H. Drew, A.F.C., relinquishes his commn. on completion of service (Aug. 4, 1928). The follg. relinquish their commns. on completion of service, and are permitted to retain their rank:—Flight-Lieut. C. G. Hetherington (Jan. 22); Flying Officer H. J. Lucas (Jan. 21). Flying Officer H. Rhodes relinquishes his commn. on account of ill-health, and is permitted to retain his rank (Jan. 23).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Group Captain H. le M. Brock, D.S.O., to H.Q., Iraq, Supernumerary, pending posting to India, 8.1.29.

Wing Commanders: H. J. F. Hunter, M.C., and L. T. N. Gould, M.C., to R.A.F. Staff College, Andover, for Staff Course, 21.1.29. J. C. Quinnell, D.F.C., C. F. A. Portal, D.S.O., M.C., C. W. H. Pulford, O.B.E., A.F.C., to R.A.F. Depot, Uxbridge, whilst attending Course at Imperial Defence College, 14.1.29. F. Sowrey, D.S.O., M.C., A.F.C., to R.A.F. Depot, Uxbridge, whilst attending Staff Course at Army Staff College, Camberley, 21.1.29. J. T. Babington, D.S.O., to H.Q., Iraq, for duty as Station Commandant, 8.1.29. L. L. MacLean, to H.Q., India, for Air Staff duties, 27.12.28.

Squadron-Leaders: E. J. Hodsoll, to R.A.F. Depot, Uxbridge, 29.12.28. I. T. Lloyd, E. L. Howard-Williams, M.C., J. H. D'Albiac, D.S.O., D. Colyer, D.F.C., W. E. G. Bryant, M.B.E., L. O. Brown, D.S.C., A.F.C., and R. V. Goddard, to R.A.F. Staff College, Andover, for Staff Course, 21.1.29. C. J. Mackay, M.C., D.F.C., and C. E. H. Medhurst, O.B.E., M.C., to R.A.F. Depot, Uxbridge, whilst attending Course at Imperial Defence College, 14.1.29. D. W. Clappen, to No. 2 Flying Training School, Digby, 18.1.29. E. B. Beauman, to R.A.F. Depot, Uxbridge, whilst attending Staff Course at Army Staff College, Camberley, 21.1.29. R. F. S. Leslie, D.S.C., D.F.C., A.F.C., to Superintendent of Reserve, Hendon, 15.1.29.

Flight-Lieutenants: J. A. Gray, D.F.C., to No. 55 Sqdn., Iraq, 11.1.29. C. A. Horn, to No. 70 Sqdn., Iraq, 11.1.29. J. M. Burd, M.C., to No. 84 Sqdn., Iraq, 11.1.29. H. W. L. Saunders, M.C., D.F.C., M.M., E. D. Davis, H. G. Crowe, M.C., A. P. Ledger, M.B.E., F. H. E. Reeve, V. R. Gibbs, D.S.C., J. G. Walser, M.C., W. M. Yool, F. L. Hopps, A.F.C., L. E. M. Gillman, and J. A. McDonald, to R.A.F. Staff College, Andover, for Staff Course, 21.1.29. G. T. Richardson, to No. 58 Sqdn., Worthy Down, 11.9.28. P. H. Mackworth, D.F.C., and J. W. Jones, to Air Ministry, Directorate of Training, 14.1.29. G. H. Harrison, D.F.C., to R.A.F. Base, Calshot, 14.1.29. J. M. J. C. J. I. Rock de Besombes, to R.A.F. Depot, Uxbridge, 15.1.29. J. G. Hawtrey, to Aeroplane and Armament Experimental Estab., Martlesham Heath, 14.1.29. E. S. C. Vaughan, M.C., to No. 10 Group H.Q., Lee-on-Solent, 17.1.29. E. H. Searle, to Sch. of Army Co-operation, Old Sarum, 27.1.29. R. Harrison, D.F.C., to Central Flying Sch., Wittering, 5.2.29. R. M. C. Macfarlane, M.C., to Sch. of Army Co-operation, Old Sarum, 7.1.29. J. D. Breakey, D.F.C., to No. 204 Sqdn., Cattewater, 1.2.29. D. D'H. Humphreys and H. E. King, to R.A.F. Base, Gosport, 14.1.29. H. G. Brookman, to No. 207 Sqdn., Eastchurch, 1.2.29. L. K. Barnes, to No. 5 Flying Training Sch., Sealand, 1.1.29. J. McBain, D.F.C., to No. 60 Sqdn., India, 16.12.28. S. P. George, to No. 1 (Indian Wing)Station, 16.12.28.

Flying Officers: W. J. Coadwell, D.S.M., to Supply and Transport Services, Base Transport Section, Iraq, 1.1.29. H. J. Walker, to No. 30 Sqdn., Iraq, 11.1.29. F. Townsend and E. L. J. Rowe, to No. 6 Sqdn., Iraq, 11.1.29. J. Marson, to No. 30 Sqdn., Iraq, 11.1.29. J. L. B. Stevinson, to No. 2 Flying Training Sch., Digby, on appointment to a Temp. Comm. on being seconded from the Army, 15.1.29. W. L. Bateman and A. M. D. Howes, to No. 36 Sqdn., Donibristle, 19.1.29. H. J. Paine, to H.Q., Iraq, 8.1.29. M. Brunton, to No. 24 Sqdn., Northolt, 17.1.29. P. G. S. Gardiner, to No. 23 Sqdn., Kenley, 28.1.29. R. P. P. Pope, D.F.C., and W. E. P. Johnson, to Central Flying Sch., Wittering, 5.2.29. K. E. Parker, to R.A.F. Base, Gosport, 14.1.29.

Pilot Officer: L. P. Moore, to No. 6 Sqdn., Iraq, 11.1.29. F. E. Abbott, F. R. Bevan, J. A. Brown, C. R. Crow, J. S. Douglas, G. M. Easton, E. Esmonde, J. W. C. Glen, D. B. Knapp, H. V. L. 'Amy, A. E. V. Mathias, W. S. Monroe, G. B. Musson, A. T. Orchard, G. M. Payne, T. J. Rees, G. H. Robertson, E. G. Sharp, J. A. Simpson, G. R. Warner, and E. F. Wheeler, to No. 2 Flying Training Sch., Digby, with effect from 13.1.29. E. L. Mole, to No. 2 Flying Training Sch., Digby, on appointment to a Permanent Comm., 14.1.29. N. A. Tait, to R.A.F. Base, Gosport, 14.1.29.

Stores Branch.

Wing Commander E. W. Havers, to R.A.F. Staff College, Andover, for staff course, 21.1.29.

Flight Lieutenants.—F. N. Trinder, to R.A.F. Staff College, Andover, for staff course, 21.1.29. W. B. Frederick to Station H.Q., Hendon, 17.2.29. J. K. McDonald and F. H. Sims, to H.Q., Iraq, 8.1.29.

Flying Officers.—O. G. Ridley, M.C., to No. 30 Sqdn., Iraq, 11.1.29. R. B. Brown, to No. 84 Sqdn., Iraq, 11.1.29. H. D. Jackman, to No. 55 Sqdn., Iraq, 9.1.29.

Pilot Officer H. E. Freestone, to R.A.F. M.T. Depot, Shrewsbury, 16.1.29.

Accountant Branch.

Flight Lieutenants.—H. G. Bushell and D. J. Sherlock, to H.Q., Iraq, 8.1.29.

Flying Officers.—C. E. Aston, to H.Q., Iraq, 8.1.29. F. M. Hall, to No. 3 Stores Depot, Milton, 30.1.29.

Medical Branch.

Wing Commander H. W. Scott, M.B., B.A., to R.A.F., Depot, Uxbridge, 3.1.29.

Flight Lieutenant (Hon. Sqdn.-Ldr.) G. S. Ware, M.B., B.S., to R.A.F. Depot, Uxbridge, on appointment to a Temp. Comm., 7.1.29.

Flying Officers.—J. J. Quinlan, M.B., and P. B. L. Potter, M.B., to H.Q., Iraq, 11.1.29.

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New "Argosy" Air Liners

THE three new Armstrong-Siddeley "Argosy" air liners now being built in Coventry for Imperial Airways Limited, will be equipped with an interesting type of servo-lateral control which, when combined with the anti-stalling automatic slots, will make the machines still safer and easier to fly. The new liners will be fitted with more powerful "Jaguar" engines of the geared type, and as the propellers turn slower in consequence and are situated farther away from the cabin their noise will be less noticeable. An improved arrangement of exhaust piping will also decrease the noise, while the comfort of passengers has been further studied by the perfection of a new type of ventilating system and a very attractive interior colour scheme designed by a well-known artist. Owing to various improvements in design, the cruising speed has been increased from 90 to nearly 100 m.p.h. The radius of action has also been increased from 350 to 500 miles owing to the larger supply of petrol carried.

Skywriting Machine Crashes

WHILST skywriting for an advertising campaign, an aeroplane crashed at Kostheim, near Wiesbaden, on January 19. The pilot escaped, but the machine was burnt.

Mr. Cecil H. Broadhurst

THE well-known publicity adviser, Mr. Cecil H. Broadhurst, has joined Sternol, Ltd., of 16, Finsbury Square, London, E.C.2, in that capacity. Sternol, Ltd., is one of the oldest lubricant manufacturers in Great Britain.

Cellon, Limited

OWING to continued expansion of the business of Cellon (Richmond), Ltd., larger premises have been constructed at Ham Common, Kingston-on-Thames, and the Administrative offices were removed to that address on January 28 last. All correspondence, orders, etc., should now be addressed to: "Cellon, Ltd.," Cellon Works, Upper Ham Road, Kingston-on-Thames. Pending the complete removal of existing plant and machinery to the new premises all goods should be addressed to Cellon Works, Richmond, Surrey, as hitherto, unless otherwise instructed.

All the World's Aircraft*

THE 1928 edition of that valuable book of reference "All the World's Aircraft," has now been published. Although much the same size as the previous volume, the contents are, we think, even larger than before. As usual, it is divided into sections, but this time in the Historical section the Civil and Service sides have been separated, and now form two parts in themselves (parts A and B). Part C is devoted to aircraft, Civil and Military, of the various nations—all the machines described and illustrated being of latest design, that is, none are obsolete. The American section is remarkably large (68 pages), showing the extraordinary growth of aeronautics in that country. Part D deals with aero engines and Part E with Airships. Helicopters are included at the end of Part C, while the volume finishes up with an excellent index of aircraft and engines, not only under the constructors' names, but under "type" names as well. Every year, in every sphere, "All the World's Aircraft" gets better and better!

* "All the World's Aircraft." Compiled by C. G. Grey, edited by Leonard Bridgman. Sampson Low, 42s. net.

IN PARLIAMENT

R.A.F. and Kabul Evacuation

REAR-ADMIRAL SUETER, on January 24, asked the Secretary of State for Air whether he can give any details of the evacuation of the women and children of the International Corps Diplomatic of Kabul in December last; whether he can arrange with the India Office to have issued in an official report the despatches of the Commander-in-Chief in India dealing with these air operations; and the number and nationality of those rescued, supplies carried, type of machines used, the name of the air officer in command, and the names of pilots who performed this feat?

Earl Winterton (the Under-Secretary of State for India), who replied, said at present I have very little information beyond what has already appeared in the press. So far as I am aware, the total number of British and foreign nationals removed by aircraft from Kabul has been 149, of whom 50 were of British nationality, 37 of Turkish, 23 of German, 10 of French, 9 of Persian and the remainder of miscellaneous nationalities. The Government of India has been asked for a report on the whole subject, and the question of publishing the remaining particulars will be dealt with on its receipt. I am sure that hon. members will have noticed with satisfaction the remarkable efficiency with which this evacuation was carried out and the absence of casualty or accident.

Air Squadrons in India

REAR-ADMIRAL SUETER asked the Secretary of State for Air whether he can give the number of air squadrons now kept in India; and whether any additional squadrons have been sent to India during the current financial year?

Earl Winterton: I have been asked to reply. The answer to the first part of the question is eight, and to the second part two, which are included in the eight. This increase was finally decided upon in May, 1927, and the decision was announced in India in January, 1928.

LIEUT. COMMDR. KENWORTHY asked if there was any information about the reported bombing of Indian troops by an aeroplane near the Afghan frontier?

Earl Winterton: I have been asked to reply. I deeply regret to have to state that the accident referred to in the hon. and gallant member's question has taken place, and that three Indian officers and 10 Indian troopers, with 16 horses, have been reported killed, and 12 troopers wounded. The whole unfortunate incident will be fully investigated, and I am not in a position to make any further statement at present. I understand that the aeroplane in question was engaged in practice, but I think it would be unfair to all concerned for me to make any statement until a full report has been received.

PERSONALS

To be Married

The wedding of FLYING OFFICER MORGAN RICE EDMONDES, R.A.F., the younger son of the late Maj. Charles Edmondes, Old Hall, Cowbridge, Cardiff, and Mrs. Edmondes, O.B.E., Erw Fain, St. Hilary, Cowbridge, and MARJORIE FLORENCE, the younger daughter of Mr. and Mrs. HARRISON, of Penllyn, Cowbridge, will take place on February 12, at the Parish Church, Cowbridge.

The engagement is announced of HECTOR GOLLAN HAMILTON, R.A.F., son of Mr. and Mrs. T. M. Hamilton, of Dumbreck, Glasgow, and JANET KATHARINE ANDERSON, elder daughter of the late Andrew Malcolm Anderson, and Mrs. Anderson, of Long Crendon, Thame, Oxon.

The engagement is announced between FLIGHT LIEUTENANT NOEL VIVIAN MORETON, R.A.F., son of Mr. and Mrs. H. Moreton, of Palmer's Green, and BETTY H. SLADE, daughter of the late Richard Slade and Mrs. Francis Raikes, of Bishopstone Rectory, Salisbury.

The engagement is announced between JOHN FISHER FOSBROKE PAIN, R.A.F. (late King's Dragoon Guards), youngest son of the Rev. E. A. and Mrs. Pain, Old Bolingbroke Rectory, Spilsbury, Lincs, and MARY (MOLLY) ZÉLIE LLOYD-EVANS, youngest daughter of the late William Lloyd-Evans and of Mrs. Lloyd-Evans, Wishford House, near Salisbury.

The engagement is announced between Mr. CHARLES W. A. SCOTT, of the Queensland and Northern Territory Aerial Services, Ltd., Australia, elder son of Mr. and Mrs. Kennedy Scott, 57, Addison Road, Kensington, and KATHLEEN, daughter of Mr. and Mrs. J. M. O'NEILL, Park Street, Brunswick, Melbourne.

AIR MINISTRY NOTICE TO AIRMEN

Flights Across the Channel: Arrangements for Reporting and Search

1. AN Aldis lamp has been provided at Lympne Aerodrome for the acknowledgment of circuit signals made by aircraft not equipped with W/T and utilising the arrangements for signalling their passage across the English Channel, described in Notice to Airmen No. 38 of 1928.

2. The fact that a circuit made around Lympne Aerodrome, notifying arrival from or departure for the Continent, has been observed by the ground personnel, will be indicated to the pilot of an aircraft by the flashing of a white light.

3. It is of the utmost importance that this signal of acknowledgment be received before the aircraft continues its flight. Otherwise, in the case of incoming traffic, the aircraft may subsequently be reported missing, and, in the case of outgoing traffic, no notification of the intended Channel crossing will be made to the Continental reporting points, the aircraft, therefore, proceeding without the protective arrangements having been instituted.

4. *Air Pilot.*—Paragraph 46A of the Air Pilot, Great Britain (revised in A.P.M.S. 11) is affected and will be amended in due course.
(No. 6 of 1929.)

The Royal Air Force Memorial Fund

The usual meeting of the Grants Sub-Committee of the Fund was held at Iddesleigh House, on January 17. Mrs. L. M. K. Pratt-Barlow, O.B.E., was in the chair. The Committee considered in all 16 cases, and made grants to the amount of £188 0*s.* 6*d.*

Royal Air Force Short-Service Officers Required

THE Air Ministry announces:—About 100 officers will be required by the Royal Air Force for flying duties during the next few months under the short service commission scheme. Applications are accordingly invited from well-educated gentlemen of good physique who are between the ages of 18 and 25.

From among the applicants candidates are selected to appear before the Interview and Medical Board at the Air Ministry, London. If accepted they are granted short service commissions for five years' service on the active list and four years on the reserve.

During their period of service, short service officers have opportunities and facilities for study with a view to preparing themselves for civil life, and assistance is given to them in seeking employment when they pass to the reserve. A competitive examination is also held annually, and from this a limited number of short service officers are appointed to specialist courses in Engineering, Wireless Telegraphy, Armament, etc., with a view to obtaining permanent commissions in the Royal Air Force. About 20 appointments to medium service are also offered annually to short service officers, *i.e.*, to serve for a second period of five years on the active list. During this period, however, they are ineligible for the grant of a permanent commission.

Accepted candidates enter as pilot officers on probation with pay of about £273 a year increased on promotion to flying officer, normally after 18 months' service, to about £343. Officers also receive free quarters, rations, fuel and light, etc., or where these are not available, cash allowances in lieu, amounting at present to about £141 a year. On joining for duty officers with no previous service in His Majesty's Forces, receive an outfit allowance of £50. A gratuity of £375 is payable on termination of five years' service on the active list; a gratuity of £1,000 to medium service officers on termination of 10 years' service on the active list; and retired pay according to length of service and rank attained to officers granted permanent commissions.

Application forms and full details of the conditions of service can be obtained from the Secretary, Air Ministry Kingsway, London, W.C.2.

Royal Air Force Prize Cadetships

THE Air Ministry announces: The Air Council have awarded Prize Cadetships each of the value of £105 per annum for two years to the following successful candidates at the examination held in November last for entry into the R.A.F. Cadet College, Cranwell:—

R. T. Cazalet (Repton School); W. F. C. Hobson (Wellington College); F. A. Pearce (Repton School); H. T. Bennett (Rugby School); C. S. Moore (Sutton Valence School); J. P. Cecil-Wright (Wrekin College).

PUBLICATIONS RECEIVED

Aeronautical Research Committee Reports and Memoranda: No. 1167 (*Ae.* 331).—Photographs of Streamers Illustrating the Flow Around an Airscrew in the Vortex Ring State. By C. N. H. Lock. April, 1928. Price 1*s.* net. *No.* 1177 (*Ae.* 341).—A Brief Survey of Wing Flutter with an Abstract of Design Recommendations. By R. A. Frazer and W. J. Duncan. October, 1928. Price 1*s.* 3*d.* net. H.M. Stationery Office, Kingsway, London, W.C.2.

Motor Electrical Manual. 4th Edition. Temple Press, Ltd., 5–15, Rosebery Avenue, London, E.C.1. Price 2*s.* 6*d.* net (post free, 2*s.* 9*d.*).

International Aircraft Markings: Naval, Military, and Civil. By Sqdn.-Ldr. Lord Edward Grosvenor and Leonard Bridgman. Macmillan and Co., Ltd., St. Martin's Street, London, W.C. Price 2*s.* 6*d.* net.

Calendars, 1929. Rohrbach Metall-Flugzeugbau G.m.b.H., Berlin, N.65.

Book of Normals of Meteorological Elements for the British Isles. Section VI. Normals of Relative Humidity. Meteorological Office. M.O.236. H.M. Stationery Office, Kingsway, London, W.C.2. Price 9d. net.

Calendar, 1929. The Wellin-Higgins Co., Ltd., Morley House, 314-322, Regent Street, London, W.1.

About Airships. By E. F. Spanner. E. F. Spanner, 9, Billiter Square, Billiter Street, London, E.C.3. Price 6*s.* net.

Moniteur Officiel du Commerce et de l'Industrie. No. 323. *January* 2, 1929. Office National du Commerce Exterior, 22, Avenue Victor-Emmanuel-III, Paris.

AERONAUTICAL PATENT SPECIFICATIONS

(*Abbreviations:* Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

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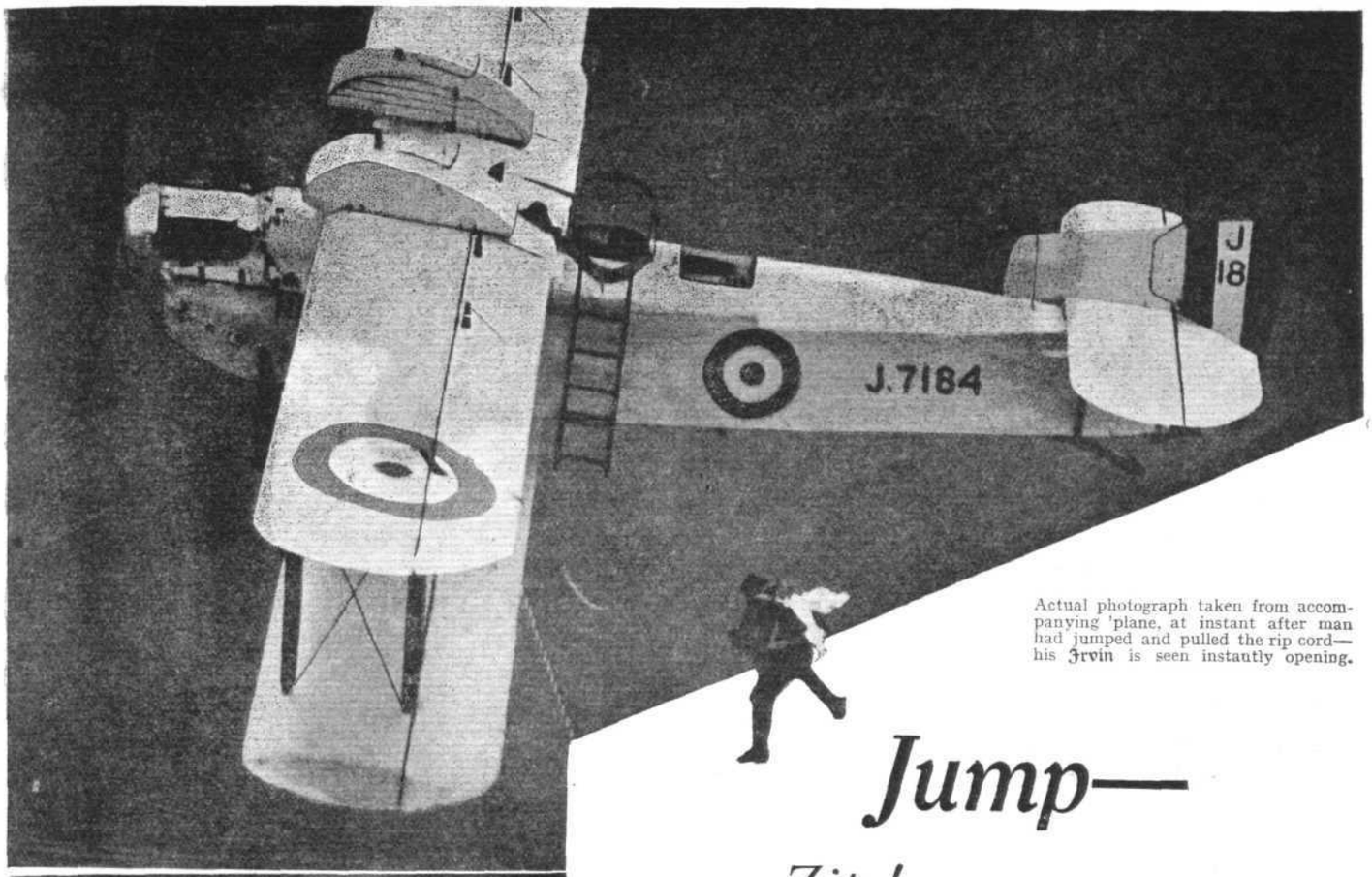

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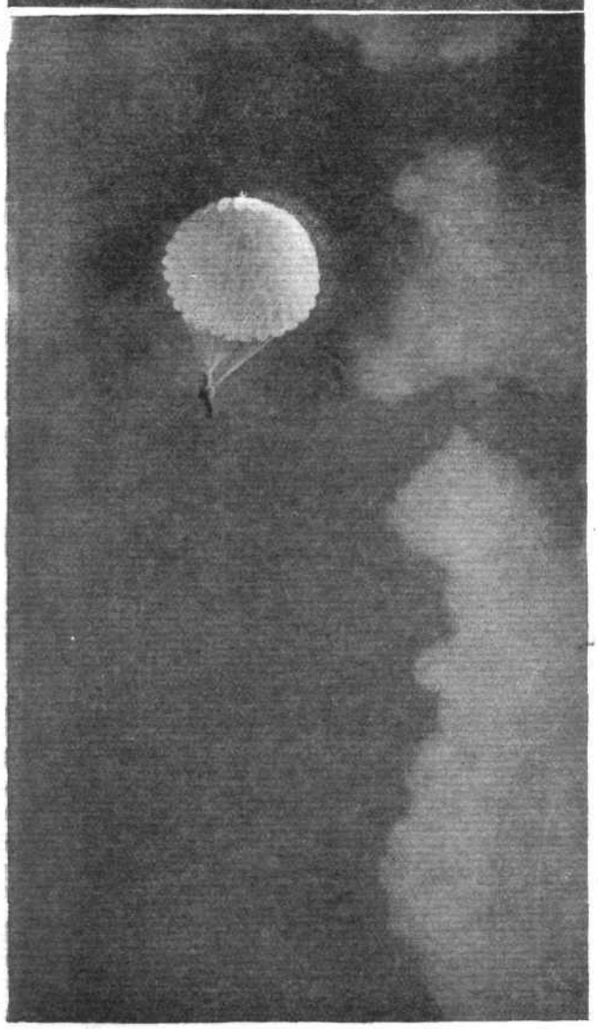

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